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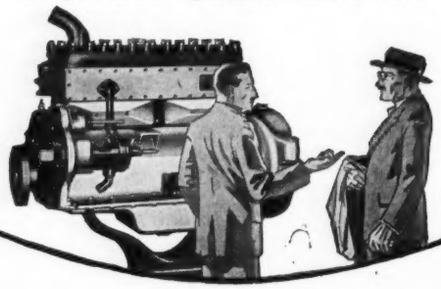

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AUTOMOTIVE INDUSTRIES
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VOL. 52 NEW YORK—THURSDAY, JANUARY 29, 1925 No. 5

# Wheel Shimmy Bone of Contention at Annual S.A.E. Meeting

## Car and tire engineers debate wheel wobble cause. Instruments for research demonstrated. Yellow Cab Mfg. Co. testing fabric bodies. New facts about dilution.

By Norman G. Shidle

"DON'T tell 'em. Show 'em." That was the new principle carried out at the annual meeting of the Society of Automotive Engineers, held in Detroit, Jan. 19-22. And it was successful. Nearly 800 technical men came to see and hear what is being done to solve the most pressing engineering problems of the day—wheel shimmy, balloon tire troubles, passenger car body construction, crankcase oil dilution, engine cooling and commercial aircraft development.

Violent differences of opinion came to light when the wheel shimmy problem wobbled on the scene. Particularly did the passenger car men differ from the tire engineers as to the cause of shimmy. Many of the former are inclined to saddle balloon tires with much of the blame for wheel wobble, but the latter point out that shimmy—perhaps under another name—was being argued before low pressure tires existed.

Otto M. Burkhardt, W. R. Strickland and E. A. De Waters analyzed the shimmy and tire problems from the passenger car angle, while R. B. Day and B. J. Lemon gave the tire side of the controversy. Before the end of the meeting everybody had their say on this subject and considerable information had been added to shimmy literature.

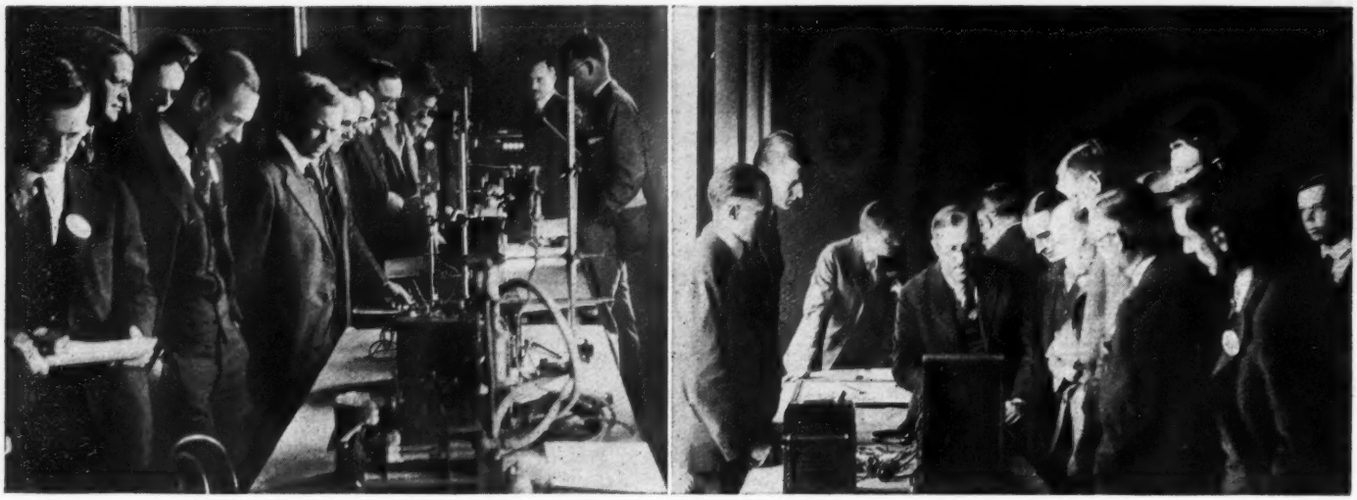
The Story of the Chicago Automobile Show Will Be Found on Page 194

FOLLOWING closely on the heels of wheel shimmy from the interest standpoint came the aviation session at which W. B. Stout, president, Stout Metal Airplane Co., predicted profit-making commercial aviation in this country in the very near future, and L. M. Woolson, Packard Motor Car Co., announced the development by Packard of two new aviation engines. These new units are lighter and more powerful than the Liberty engine. Mr. Woolson predicted that before very long aviation engines will be built which will develop 1 hp. per pound of weight.

From a commercial standpoint, Mr. Stout's remarks about engine efficiency and cost were of particular interest. He stated his belief that any airplane to be made a paying proposition immediately will have to use a Liberty engine because of its relatively low cost under present conditions of supply and demand.

MORE than fifteen new instruments designed specially for automotive experimental work were shown in action at the research session, which provided a complete resumé of what is being done behind laboratory walls to improve the design and performance of motor vehicles. Less noise, reduced vibration, cleaner engines and decreased dilution of crankcase oil, are among the chief ends being sought in automotive laboratories today if the instruments shown are true indicators of the work being carried on.

The Yellow Cab Manufacturing Co. is carrying on extensive tests with the Weymann type of body con-



*As is indicated by the crowds, no small amount of interest centered in the exhibits of various devices used in making tests or for research*

struction and at the present time is operating experimentally 35 cabs with this type of body. This important development was disclosed at the passenger car body session by Paul H. Geyser, vice-president of the Yellow company. While it has been known for some time that the Yellow organization had obtained a license from the Weymann company, the extent to which the American outfit has carried its experiments was not generally understood. The chief advantages of the Weymann construction, according to Mr. Geyser, are light weight and silence in operation.

A detailed description of the Weymann body by G. W. Kerr, Reo Motor Car Co.; the story of all-metal body construction, told by E. G. Budd, president, Budd Manufacturing Co., and an analysis of the relation between the production car builder and the custom body manufacturer were other features of the passenger car body sessions.

The two papers presented by C. E. Summers, General Motors Research Corp. on engine vibration and air cleaners were specially noteworthy features of the meeting.

*H. L. Horning, who has recently taken office as president of the S. A. E.*

An unusual amount of discussion followed the paper on vapor cooling which was presented by N. S. Diamant on the last evening of the meeting. Despite the fact that this session was held at the tag end of the program, nearly 200 engineers came back after dinner to hear it and spent some two hours arguing about the relative merits of steam and water cooling methods.

Following the meeting, H. L. Horning, the incoming president of the Society, announced his committee appointments for the coming year. A particularly strong finance committee has been named for 1925. It consists of A. R. Erskine, chairman; A. J. Brosseau, Christian Girl, W. L. Batt, and C. B. Whittelsey. Other committees are:

**House committee:** David Beecroft, chairman; Vincent G. Apple, G. P. Dorris, E. H. Ehrman and A. W. Copeland. **Meetings committee:** T. J. Litle, Jr., chairman; O. M. Burkhardt, P. G. Zimmerman, O. B. Zimmerman, S. W. Sparrow, L. L. Roberts, A. W. Herrington, H. W. Asire, C. O. Guernsey, G. W. Kerr, K. L. Herrmann and L. C. Hill. **Publications committee:** E. P. Warner, chairman; Herbert Chase, F. C. Mock, O. C. Berry and W. E. Lay. **Membership committee:** A. F. Masury, chairman; W. S. Nathan, F. A. Cornell, C. H. Warrington and W. L. Moreland. **Sections committee:** J. H. Hunt, chairman; F. F. Chandler, vice-chairman; R. E. Wilson, Chicago; G. L. McCain, Detroit; G. T. Briggs, Indiana; R. E. Northway, New England; G. W. Gilmer, Jr., Pennsylvania; A. W. Herrington, Washington; R. E. Plimpton, Metropolitan; J. W. White, Buffalo; W. E. England, Cleveland, and John Younger. (Sections representatives from Dayton, Milwaukee and Minneapolis have not yet been appointed.) **Constitution committee:** A. L. Riker, chairman; A. J. Scaife and Henry M. Crane.

## Meeting Was Highly Successful

The meeting undoubtedly was one of the most successful ever staged by the Society. Not only did the papers contain new and useful information, but the presentations were far above the averge. A visitor to this meeting who had never attended any previous engineering sessions would find it difficult to trace the origin of the long standing idea that engineers may know a good bit, but that they can't get it across in public.

Every session had a competent chairman and some of those presiding officers who always are good were bet-

ter than usual. Colonel Alden kept things moving at high speed during the session on shimmy and the sharp comments with which he punctuated the discussion always were pertinent as well as lively. T. J. Litle, Jr., H. I. Horning, J. G. Vincent, L. C. Hill, George L. Mercer, Alexander Taub, R. E. Wilson and C. L. Lawrence, each in his own way kept life and energy dominant in the session over which he presided.

The large number of instruments and apparatus used to illustrate the talks unquestionably were important factors in keeping the interest at a high pitch through the three-day conference. Attendance totaled nearly 800. The annual carnival was held Wednesday evening at the Oriole Terrace. Technical subjects were not discussed.

Two amendments to the constitution were adopted at the annual business meeting at which Henry M. Crane presided on Tuesday evening. One amendment extends the scope of society membership to include engineers who take responsible charge of automotive engineering work, **including operation and maintenance.** The other records in the constitution approval of the practice which has been followed for some time of having the sections committee composed of one representative from each section in addition to three members-at-large; it also provides for an increase of the meetings committee from five to twelve members.

The treasurer's report shows the gross income of the Society during the fiscal year ending Sept. 30, 1924, was $325,509, an increase of $23,955 over the gross income of the previous year. It shows also that the net unexpended income for the last year was $21,981, an increase of $3,193 over 1923. The Society owns securities representing a cost value of $133,639, which is an increase of $35,839 over the previous year.

S. A. E. membership increased 109 during the last twelve months.

Following the business session, C. E. Summers read his paper on engine vibration, which was published in AUTOMOTIVE INDUSTRIES last week.

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# Engineers Argue Cause of Wheel-Shimmy

***Balloon tire claimed to have increased trouble. F. F. Chandler discusses steering gear stresses. Wobble argument is heated.***

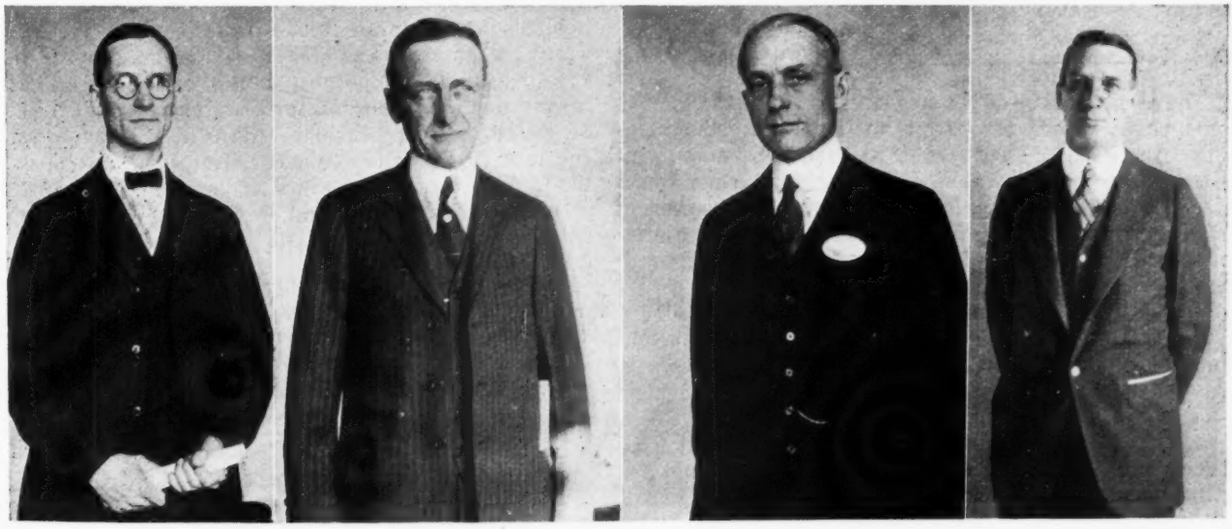
By W. L. Carver

WHEREVER two or three S. A. E. members are gathered together, shimmy becomes a burning topic of discussion. Opinions are as variable as the wind and as numerous as the number present and the discussion soon takes on the atmosphere of a battle royal. This was demonstrated completely at the sessions of Wednesday. Although the program was divided into a discussion of steering and wheel shimmy for the morning session and balloon tires in the afternoon, the only reason for the separation was the absolute necessity for nourishment and recreation on the part of about 300 members who were in attendance.

Car engineers lay the prevalent shimmy trouble to balloon tires, while tire engineers assert that if the car engineers will correct steering gears and springs the trouble will vanish.

That these two subjects are closely related seemed to be apparent to all present, and while a decided difference of opinion exists, the discussion, along with the close study that has been made of the various related factors, is evolving a better understanding of the basic problems. Car engineers and some tire engineers apparently are convinced that a better understanding of the vibratory characteristics of the balloon tire and the car spring will open the road for final solution. Many of the papers presented at these meetings indicated an appreciable degree of progress along this line.

Along with its greater vibratory characteristics, the



*Some of the men who contributed to the Balloon Tire Session: Left to right, R. B. Day, E. A. DeWalters, J. G. Vincent and B. J. Lemon. Mr. Vincent was chairman*

balloon tire has greater flexibility, and this quality, it was stated, is responsible for a variation in moments at the opposite ends of the front axle. This variation induces the shimmy and in turn shifts the center of gravity of the car and thus effects a periodic change in the loading of the front springs which causes the so-called tramping action or gallop. Some of the trouble has undoubtedly been caused by faulty geometry in construction of the steering linkage. To eliminate this difficulty one speaker advanced a hydraulic steering gear in which the relative motions of steering are confined to the front axle assembly and are dissociated from the chassis and springs.

As many of the topics and papers are closely interrelated and the meetings ran to great length, digests have been made to include those which are associated most closely. The first which follow include the papers presented by W. R. Strickland and Otto M. Burkhardt.

## Front Wheel Shimmy

### —*By W. R. Strickland*

IN discussing the subject of wheel shimmy in his paper, W. R. Strickland, assistant chief engineer of the Cadillac Motor Car Co., pointed out that it often had proved possible to cure this fault in cars fitted with high pressure tires by the simple expedient of raising the inflation pressure a few pounds. Since this remedy cannot be used with balloon tires without destroying their inherent advantages, it became necessary to seek other remedies and Mr. Strickland's paper outlined a number of tests made by the Cadillac engineering staff.

1. In only a few cases has balancing the assembled wheel, rim, tire and tube reduced shimmy, and in one case such balancing increased shimmy.

2. Materially increasing the width of rim eliminated shimmy in some cases, but was not effective in others. Tires of 6.60 and 6.75-in. section on 6 in. work well.

3. Changes in the geometry of the steering mechanism

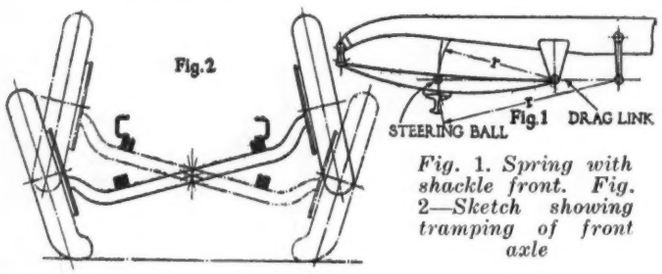



*Fig. 1. Spring with shackle front. Fig. 2—Sketch showing tramping of front axle*

layout have not resulted in preventing shimmy except in some cases where the front springs were shackled at their front (Fig. 1) instead of at their rear ends. In some cases the wheels wabbled even when blocks were inserted to prevent all spring action, but the tramping action, Fig. 2 (ossilation of front axle about a fore and aft axis with right and left wheels striking the ground alternately), was decreased in this case.

4. Some steering layouts with springs shackled in front worked well at low speed and badly at high speed, while others gave reverse results. Springs having standard camber in these tests proved the best while springs which were flat gave the worst results.

5. In one chassis differing from others in that it had greater flexibility in all directions but with standard steering layout and shackle arrangement, the shimmy was reduced as much as in any other tests.

6. Increasing the castor angle helps the car to hold the road at high speed, whereas decreasing it improves or cures low speed shimmying. A reverse castor angle can be used with still greater effect in respect to shimmy, but is questionable practice in other respects.

7. Use of a hydraulic dash pot to damp out shimmy involves adding several wearing joints and is not allowable when applied to the tie rod because it interferes with control when quick maneuvering is essential.

8. A semi-reversible steering gear has been found to give the greatest satisfaction over 99 per cent of the driving range. The present tendency is toward gears with greater reduction to improve ease of handling and reduce kick back, but at the expense of increased shimmying.

9. No shock absorbers or checks of any kind that would be allowable have been found of interest as a cure for tramping.

10. Tight joints in steering mechanism are found necessary to stop mild forms of shimmying, and such forms of shimmying can be cured by using plain bearings in the steering knuckles or possibly by providing joints which are loose transversely in the spring eyes, or by deep camber springs and long spring shackles or rubber joints, but disadvantages such as hard steering limit their use.

11. Reverse camber springs have shown some advantages as have devices for clamping spring leaves together (presumably to increase interleaf friction) but more work must be done before conclusions in this respect are reached.

12. Changes in flexibility of springs are not of much importance when the total weight to be carried by springs is unchanged. Increasing the load increases the intensity of shimmying and in particular the tramping action.

13. Changing foregather or toe-in of front wheels, making the wheels parallel or even toeing them out might help control wabble, but probably would not be allowable on account of increased tire wear.

14. Some evidence indicates that cars with four-wheel brakes shimmy more than those without them, but we have found that practically the same chassis shimmies as badly without as with them. Shimmying has been controlled in some cases by adding still more weight than is involved in the addition of front wheel brakes.

15. It has been proved experimentally that if sufficient weight is added to the rim of a wheel having a balloon tire to make the moment of inertia of the assembly equal to that of the corresponding size of high pressure tire and wheel the wabble is controlled similarly, but the desirability of doing this in practice is questionable.

16. Shimmying has not been confined to designs incorporating center point steering, but tests indicate that, in any one axle, the greater the distance from the center of gravity of the wheel to the center line of the pivot, the less will be the intensity of the shimmy.

17. A vertical pivot pin with approximate center point steering has resulted in improvement in respect to shimmying, but other expedients are required to produce a cure.

## Remedies for Shimmying

### —*By Otto M. Burkhardt*

OTTO M. BURKHARDT, consulting engineer of the Pierce-Arrow Motor Car Co., suggested the following remedies for shimmying:

(1) Design so that no slackness can develop; for instance, use ball and socket joints, with springs to take up wear.

(2) Design for rigidity; that is, use strong levers

*Reading from left to right are, H. A. Huebotter, J. W. White, Otto M. Burkhardt and W. R. Strickland who, with F. F. Chandler, contributed to the Wheel-Shimmy Session*

and large diameter tubes for the tie bar and the drag link.

(3) Use effective devices to absorb kinetic energy wherever it is likely to accumulate.

In leading up to these conclusions Mr. Burkhardt said in part:

"It is difficult to design a complete steering-mechanism of high rigidity and at the same time keep the unsprung weight low. Only reluctantly can we accept an addition to the unsprung weight, because this means greater impacts, hence, more shimmying. The effect produced by front wheel brakes is sufficient proof of this line of reasoning. Being limited in regard to the amount of play and looseness that can be removed, we must endeavor to eliminate the periodic forces that, by supplementing the wear in the mechanism, produce shimmying.

"A low pressure tire is capable of absorbing considerably more energy than is a high pressure tire. For this reason, a balloon tire very readily assumes a periodic rebound on slightly bumpy roads. This characteristic is important because it is mainly responsible not only for shimmying and tramping but also for the disagreeable phenomena known as pitching and bobbing.

### Must Absorb Kinetic Energy

"When a load falls on both the springs and the tires, if the tires are of the high-pressure type, the springs will absorb nearly all the kinetic energy, whereas, if they are of the balloon type, a large part of the kinetic energy will be stored in the tires.

"Accumulation of energy increases in direct proportion to the stiffness of the chassis springs and decreases as a function of the inflation pressure. This statement is borne out by observing that balloon tires, under the relatively stiff front springs, give much more trouble than do those under the rather flexible rear springs. Hence, the use of stiffer springs will not remove bobbing and tramping. Bobbing occurs when the deflection of the front spring synchronizes with the deflection of both front tires. If the tire and the spring of one side are one-half cycle behind the tire and the spring of the other side, tramping is produced.

"We are dealing with kinetic energy and in order to minimize its ill effects we must resort to devices designed to absorb kinetic energy. As, however, we have no devices to absorb the energy stored in the tires, it cannot be good practice to use low pressure tires and at the same time stiffen the springs. It is desirable that all road shocks should be absorbed by the tires and the springs, but at present the greater part of the shocks must be taken by the springs, because to them can be applied the means of absorbing the kinetic energy; and kinetic energy is the root of this evil."

Continuing, Mr. Burkhardt pointed out that a lack of lateral stability of the tire has a profound effect upon steering and causes shimmying, unless the alternating forces set up are damped out by setting up the parts of the steering mechanism so snugly as to prevent these forces from gaining momentum.

"If, however, the slightest slackness exists in the linkage, the wheels will swing with an ever-increasing amplitude and, inasmuch as the steering mechanism is not irreversible, it is obvious that the steering wheel will partake of the oscillation known as shimmying. It is well known, however, that cars with center point steering, or near center point steering, shimmy very much worse than do others that have been designed so that a substantial lever arm exists between the king pin axis and the center of the contact area.

"Even though the dash pot developed by the Goodyear Company acts on only one wheel, it prevents the later forces from synchronizing and, what is more important, prevents the forces from gaining momentum.

"We know that friction disks mounted on the king pin and the knuckle shaft will reduce shimmying, because they absorb kinetic energy."

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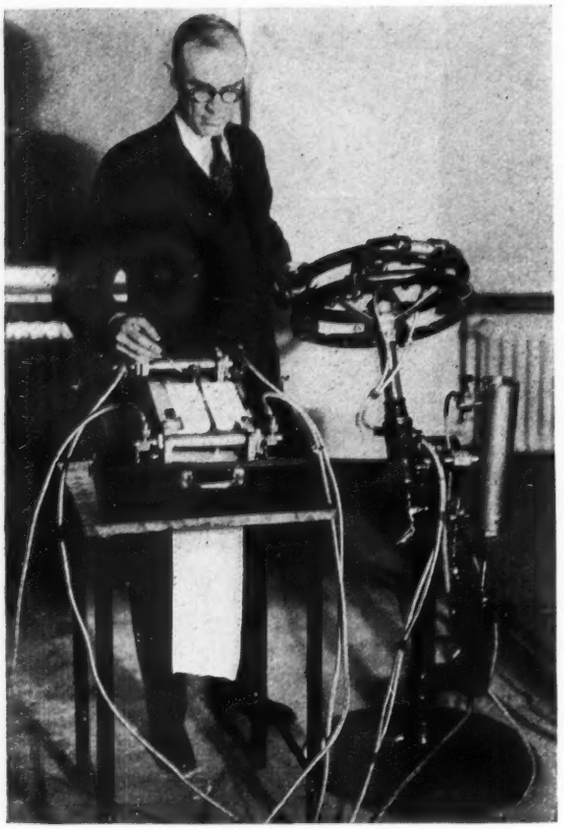
## How Hard Does a Car Steer?
## —*By F. F. Chandler*

A METHOD of measuring the stresses involved in steering a car and those created in the drag link both in steering action and reaction due to road shocks was the subject matter of the paper presented by F. F. Chandler, chief engineer of the Ross Gear & Tool Co. The first part of this paper described a special set of pressure and recording instruments especially designed for making those measurements. These included a strip chart device for recording the oil pressures developed in cylinders arranged at the rim of the steering wheel and in the drag link. This recording device and the piston and cylinder



*F. F. Chandler, chief engineer of the Ross Gear and Tool Co., with his apparatus*

arrangements from which the pressure measured is transmitted are illustrated in accompanying cuts.

Some extracts from the Chandler paper follow:

Fig. 1 shows the strip chart recording instrument. This consists of a conventional clockwork mechanism so modified that the strip chart will move in a horizontal plane while two records are being made by two pens. Each of these pens is operated by its own piston and spring assembly. The pistons and springs are contained in cylinders mounted at either end of the instrument.

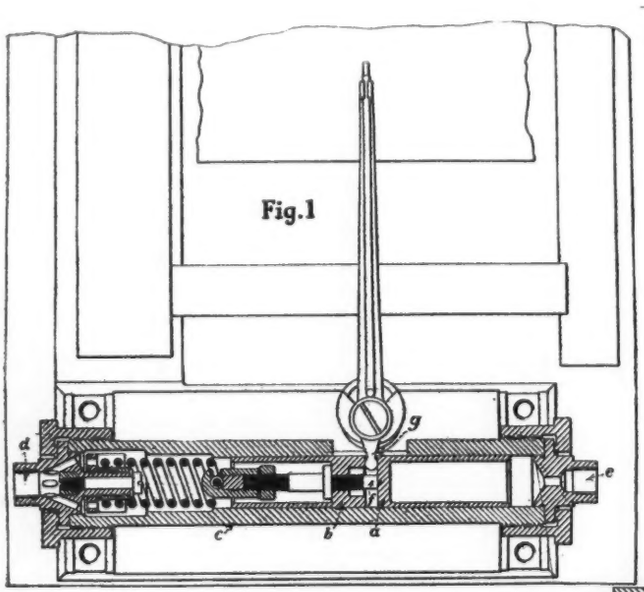
Pistons are operated by hydraulic pressure carried through flexible tubes connected with the cylinders. One pen produces a record of the driver's effort applied at the steering wheel and shows whether the driver is making a right or left turn.

Arrangement of the parts is shown in Fig. 1 Pistons *a* and *b* lie in cylinder *c*. When pressure is admitted through openings *d* and *e*, these pistons move toward each other until the piston *a* meets the stud *f*, which projects from the piston *b*. The space left between the ends of the two pistons is just sufficient to allow insertion of pen arm *g*.

Connected with piston *b* is a steam engine indicator spring, the opposite end of which is connected with the cylinder head. If a preponderance of pressure is on piston *a*, the piston will move toward the left and, since it presses on the projection *f*, it will also move piston *b* toward the left, compressing the spring and pushing liquid out of the opening *d*. The pen arm *g* will also move to the left, moving the pen itself to the right of the zero line on the strip chart. With a preponderance of pressure in the opposite direction, the pen will be moved to the left of the zero line. The same result could be accomplished if the two pistons were made into one, but it was thought that better fits could be preserved by the method adopted.

Attached to the steering wheel is an auxiliary steering wheel that can be mounted on the driver's wheel. Portions *h* of this mounting move rigidly with the driver's wheel. At *k*, bearing is turned on portion *h* on which turns the auxiliary wheel *j*. In the rim of the auxiliary wheel *j* is inserted a cylinder that moves whenever the auxiliary wheel is moved. In this cylinder is a piston with a ball joint in the center and connections with the other portion *h*. Two flexible tubes are connected at points *l*, the opposite ends of the tubes being connected with the ends of the cylinder in the recording instrument.

Fig. 3 shows a pressure producing instrument for use with the drag link so that stress, alternation of stress,



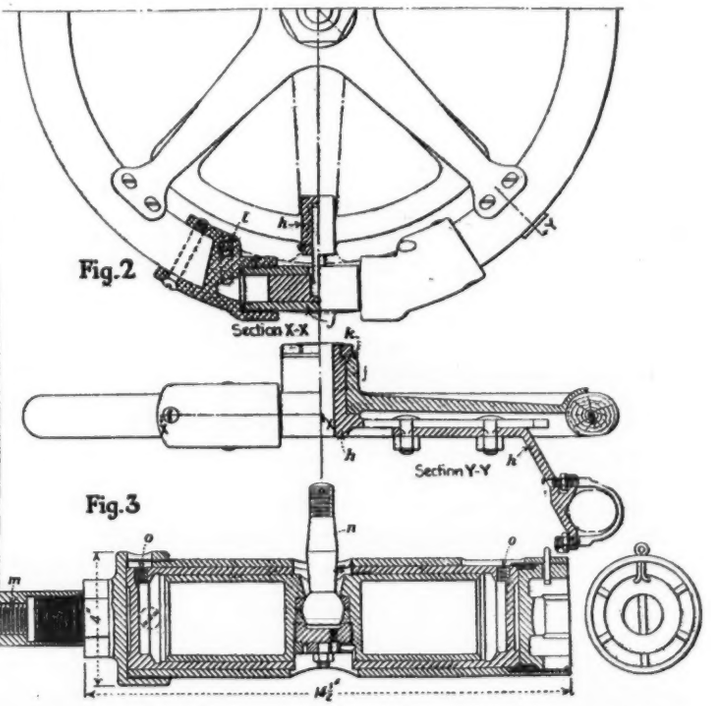
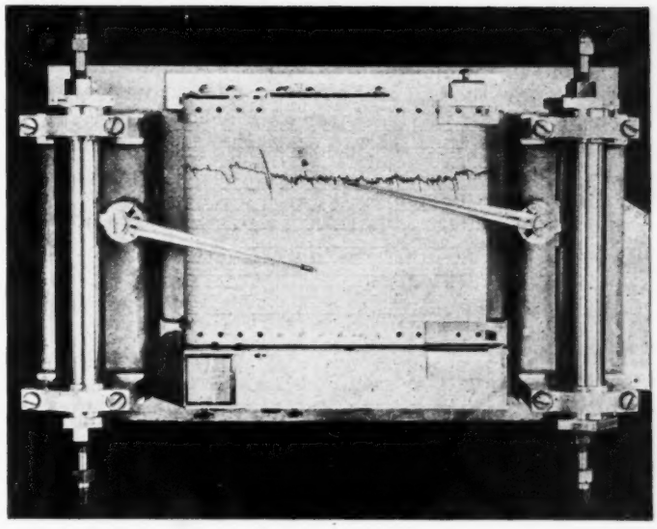




*Fig. 1—Recording instrument for making record of forces applied to steering gear. Fig. 2—Pressure cylinder applied to steering wheel. Fig. 3—Pressure cylinder applied to drag link*

steering effort, the result of impact, and road inequalities all will produce corresponding pressures in the liquid in the cylinder. These pressures are transferred to the other cylinder of the recording instrument simultaneously with the effort put into the steering wheel by the driver.

In discussing the results of some early tests made with this instrument, Mr. Chandler said: "I have proved that, in ordinary cars, when not in motion, the drag link stress ranges from 400 to 600 lb. or more. I have checked these results by disconnecting the drag link and measuring the moments necessary to move the wheels on various kinds of street, with both high pressure and balloon tires. I have proved that balloon tires require 50 per cent greater steering effort than do high pressure tires.

"I have data proving that, in one high grade popular car, a reduction of only a few ounces of steering effort produced the difference between unsatisfactory and very satisfactory results. Such results should set up certain standards of perfection, with data to show how they can be obtained. I also have data, secured in another way, that show differences of 450 per cent in the friction of steering knuckle thrust bearings as they are used today on cars of popular make."

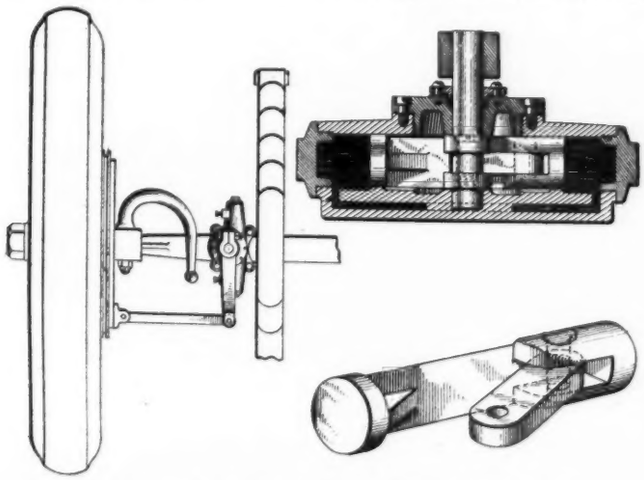


*Indicating instrument referred to by F. F. Chandler*

## Prevention of Shimmying
### —*By R. B. Day*

TWO general types of shimmying are recognized in the paper by R. B. Day of the Research Division, Goodyear Tire & Rubber Co., and similar references to these types were mentioned by other authors. The first of these, termed low speed shimmy, is defined by Mr. Day as "merely a persistent front wheel wabble, without abnormal bouncing of the axle," and the second, termed high speed shimmy, is "chiefly a persistent bouncing of the axle, accompanied by wabbling of the wheels." The former occurs at speeds of 5 to 50 m.p.h. and the latter at 45 to 75 m.p.h., according to Mr. Day.

After noting the fact that front wheel brakes and low inflation pressures tend to increase shimmy and bouncing, Mr. Day mentioned some efforts to prevent these by stiffening the tire in various ways and says that, although some favorable effect upon wheel wabbling could be produced, the effect on bouncing was very small and it was concluded that efforts along that line are not worthwhile. So far as the tire itself is concerned, only by using higher inflation pressures can the difficulties be overcome and use of these pressures defeats the purpose of balloon tires.



*Dashpot or damping device designed to prevent wheel wabble, referred to by R. B. Day*

Therefore it was concluded that it is better to make the car control the tire than to attempt to make the tire control the car.

This led to experiments with hydraulic damping devices for preventing wabble and stabilizers for preventing axle bounce, and it was found that all forms of shimmy could be prevented on test cars by this means. The oil dashpot was clamped to the front axle and its piston connected to the front wheel brake housing, while the ordinary form of stabilizers was used without alteration. Road shocks ordinarily felt on the steering wheel were eliminated by the damper and the effect on steering was found to be negligible. Resistance to rapid motion was considerable but to slow motion was very slight. One of these dashpots is shown in an accompanying cut.

When the same equipment used on open test cars was applied to closed cars it was found to be only 60 to 70 per cent as effective, even though the same chassis was employed.

Mr. Day concludes that "axle bounce is a resonance effect between the tires with their unsprung weights and the body springs with their loads. Each front wheel is a hammer head that strikes down against the tire and then upward against the springs. The impact against the springs moves the car body. When the impulses produced by bounding of the axle attain to a period that synchronizes with the natural period of the body and its springs, a resonance condition is reached in which the action is very severe. This action will be maintained as long as the car speed is maintained."

Another view of the cause and remedy for shimmy was expressed by B. J. Lemon in a paper presented at the balloon tire session. Mr. Lemon said in part:

"Wheels, rims, axles, brakes, speed, steering mechanism and toe-in, each in turn has been diagnosed as the producer of shimmy and in some instances special remedies have been employed. Sometimes such treatment sufficed, but the fact that each particular make of car requires a specific and generally different remedy is reasonable evidence that the cause of shimmying motion lies in improper balance. The correction is to take up lost motion, to change fundamentally the unbalance to balance whenever and wherever it occurs and not to increase inflation pressure unduly or add otherwise unnecessary devices which, at best, are, as a rule, temporary expedients only."

An apparatus for studying steering gear stresses and steering wheel loads was presented by F. F. Chandler of the Ross Gear Co. in conjunction with his paper, "Forces

and Stresses in Steering Systems." Mr. Chandler showed a number of curves indicating the loads imposed on the steering gear components, as well as the simultaneous steering wheel loads. His paper, combined with that of his co-worker, H. A. Huebotter of Purdue University, is digested above. Mr. Huebotter presented a mathematical analysis of the shimmy problem. The flexibility of the balloon tire was demonstrated as the chief cause of the trouble. Like others, but in a different manner, he advanced the theory of varying moments as the cause of shimmy and tramping.

### Results of Tests

In his paper, "Possible Causes of Wheel-Shimmy," Mr. J. W. White gave the results of a number of tests designed to determine the flexibility of balloon tires. He presented photographs of the wheel prints of both balloon and standard tires, these having been made with the car standing on a normal level surface, on a crowned road, and on a plane inclined at an angle of 6 deg. The photographs illustrated the greater lateral flexibility of the balloon tire, to which property he ascribes the tendency to shimmy. Some of the effect on steering system also is to be ascribed to cambered wheels and knuckles, and these factors in conjunction with the toe-in of the front wheels must be watched carefully in balloon tire installations.

### Hydraulic Steering Gear

Mr. White also illustrated and discussed a hydraulic steering gear in which the cylinder and piston which operates the cross rods are located on the front axle and are connected to the delivery line on the chassis by a flexible hose. The conventional steering gear is replaced by a pump arrangement and the hydraulic system is kept filled by an auxiliary tank, as in the case of hydraulic braking systems.

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## Effect of Balloon Tires on Car Design —*J. W. White*

J. W. WHITE, chief engineer, Disk Wheel Division, Wire Wheel Corp. of America, said that four things remain to be accomplished in order to secure better steering conditions on cars using balloon tires:

1—To stop angular motion of axle due to flexing of springs
2—To eliminate backlash in the steering mechanism
3—To construct a positive steering mechanism that shall be absolutely neutral
4—To divorce the steering mechanism from all influences except those which come from the road and can be damped out in the axle itself.

Mr. White then pointed out that wider rims, which tend to give the tire greater lateral stability, have a marked tendency toward decreasing shimmy, since shimmy has been amplified because the lack of lateral stability tended to bring out errors in present designs. He showed by photographs of the imprint made by balloon tires that any change in the alignment of the wheel from a true running course will affect the steering and shimmying more in low than in high pressure tires.

In concluding paragraphs of his paper Mr. White said:

"It would seem that, aside from the corrections possible in spring construction, shackling, and drag link location, the ideal condition for steering would be the elimination, so far as possible, of all king pin rake, outward leaning of the wheels, and toe-in. But this cannot be done until the backlash has been taken out of the steering mechanism and an irreversible gear can be provided.

"It is my firm belief, however, that the introduction of hydraulic steering gear will eliminate backlash and allow the corrections suggested."

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## Advances in Balloon Tire Design —*B. J. Lemon*

THE common problem was approached from another angle by B. J. Lemon in his paper. He dealt frankly and fairly with the balloon tire situation and at the same time added considerable interesting data to our meager fund of information on this subject. That he is keenly awake to the need for standardization will be appreciated from the following quotation from his paper:

"For years the tire industry has reported progress in the standardization of tire sizes only. On this problem of supreme moment to the tire maker, and of major importance to the vehicle manufacturer, confusion rather than order has ruled. The reason is the lack of definite orderly development supervision. The existence of a permanent supreme council representing those vitally interested, with power and initiative to control, could have kept order.

"Such control as has been exercised was called into being to guide rather than standardize a new development. We shall continue to report only progress until a representative committee with power, and backbone to use it, is placed in permanent control."

Other extracts from Mr. Lemon's paper follow:

"Since the advent of the high-pressure cord tire, nominal section tire sizes have been very much of a camouflage and a misnomer.

"Early balloon tires actually measured the advertised sectional width. Balloon tire heights also were selected so as to permit interchange with high pressure tires, both for immediate use on cars in service and for original equipment.

"As there was early disagreement regarding the adoption of one common wheel diameter (the 20-in. diameter) for all sectional sizes of balloon tire, no definite standards of balloon tire heights were adhered to, this resulting in the use at present of 11 tires for original equipment covering 20, 21 and 22-in. wheel diameters.

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### Results of Buick Experiments

The results of several million miles of experimental driving with balloon tires at the Buick Motor Co. were described by E. A. DeWaters, chief engineer of that company. These tests began in 1922 and the number of casing-miles runs well into the millions.

Originally the test cars were equipped with four-ply section balloon tires, the size on the larger car being 32 x 6.2. The greater tendency toward rapid wear, punctures and pinched tubes aroused great criticism and the usual galloping and shimmy troubles developed.

This led to the adoption and test of a compromise which resulted in the 31 x 4.95 and 32 x 5.77 tires, which are standard on Buick cars at present. These tires have an increased number of plies and no trouble is experienced in obtaining wheel clearance or brake interference. The number of punctures per thousand miles is normal and no trouble with tube pinching is experienced. The mileage per tire is very satisfactory.

# Fabric Bodies Undergo Tests in America

***Paul H. Geyser tells of experiments now being made. G. W. Kerr explains construction. E. G. Budd gives story of all-metal body.***

By Donald Blanchard

EXTENSIVE experiments with the Weymann type of body construction are being conducted in this country by the Yellow Cab Mfg. Co. under a Weymann license. In the discussion following George W. Kerr's paper on this type of body, P. H. Geyser, vice-president of the Yellow Cab company, stated that there are 35 cabs with Weymann bodies being operated in Chicago at the present time. From the standpoint of his company, he said the greatest advantage is absence of noise.

The bodies built by the Yellow Cab company weigh about 33 1/3 per cent less than the composite type and it is estimated that they would cost about 20 per cent less when built on a quantity basis. In regard to strength, he said the Weymann bodies made satisfactory showings when compared with the conventional construction, one of the tests being to drop the two types of bodies from a 60-ft. water tower.

### Interest Shown in Both Body Sessions

Interest at the two passenger car body sessions centered on the Weymann and all-steel types of bodies, the latter construction being described in a paper presented by E. G. Budd and Joseph Ledwinka. In addition, the relationship of the custom body builder to the production chassis manufacturer was discussed by John B. Judkins.

Mr. Budd said that the body should provide a comfortable and strong support for the passengers, adequate vision, proper protection against noise and weather, lightness, and attractive appearance. Among the advantages cited in favor of the all-steel construction as compared with the composite type of body were lighter weight for a given strength, continuous resistance to vibration, superior finish, minimum wall thickness resulting in maximum interior dimensions, and better vision due to the smaller posts.

In the composite body, it was pointed out that the wood

*G. J. Mercer, chairman, and E. G. Budd who, with J. Ledwinka, read a paper on bodies*

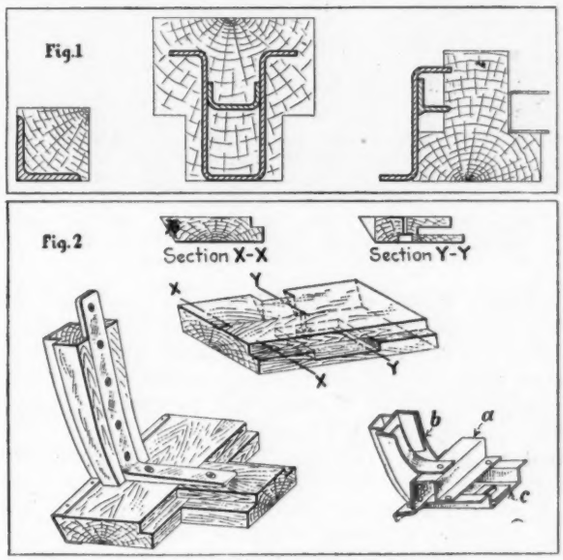



*Fig. 1, steel and wood sections of equal strength. Fig. 2, comparative study of joint between body pillar and sill in wood and steel structure*

members are weakened by being cut away for joints and hardware and that consequently larger sections have to be used. Furthermore, it was stated that the real strength of the joints of the wood framework is in the ironing, as the screws and glue used will not provide continuous resistance to vibration.

### Joints in All Steel Bodies

In the all-steel body the joints are made without cutting away any material. Furthermore, the entire structure of the steel body is used to withstand the strains, whereas in the composite body the wood framework has to meet these forces, the steel panels being added merely for appearance. In this connection Mr. Budd said that the steel used in the composite body is practically sufficient for an all-steel body of equal strength. Slides were shown to illustrate the smaller cross-sectional area of the steel members and diagrams were used to illustrate the better vision of the steel body due to the smaller posts. In regard to noise, Mr. Budd said that the steel body compares most favorably with the composite type, as the steel shell is heavier and stiffer and hence less likely to vibrate.

The all-steel body may be finished with three coats of japan with no preliminary treatment of the metal, although filling and rubbing does improve the quality of the finish. Lacquer finishes also are being used on the all-steel body and it was stated that less knifing and filling is required than on the composite bodies.

The manufacture of the bodies was illustrated by motion pictures taken in the factory and details of construction were shown by parts and assemblies which Mr. Budd brought to the meeting.

*John B. Judkins, left; G. W. Kerr, center, and L. Clayton Hill, chairman, who made one Passenger Car Body Session interesting*

Mr. Kerr's paper on the Weymann body was based on observations made during a recent trip to Europe. He visited the Weymann factory in Paris and interviewed licensees both on the Continent and in England. He said that this type of construction is gaining considerable favor abroad in all price classes.

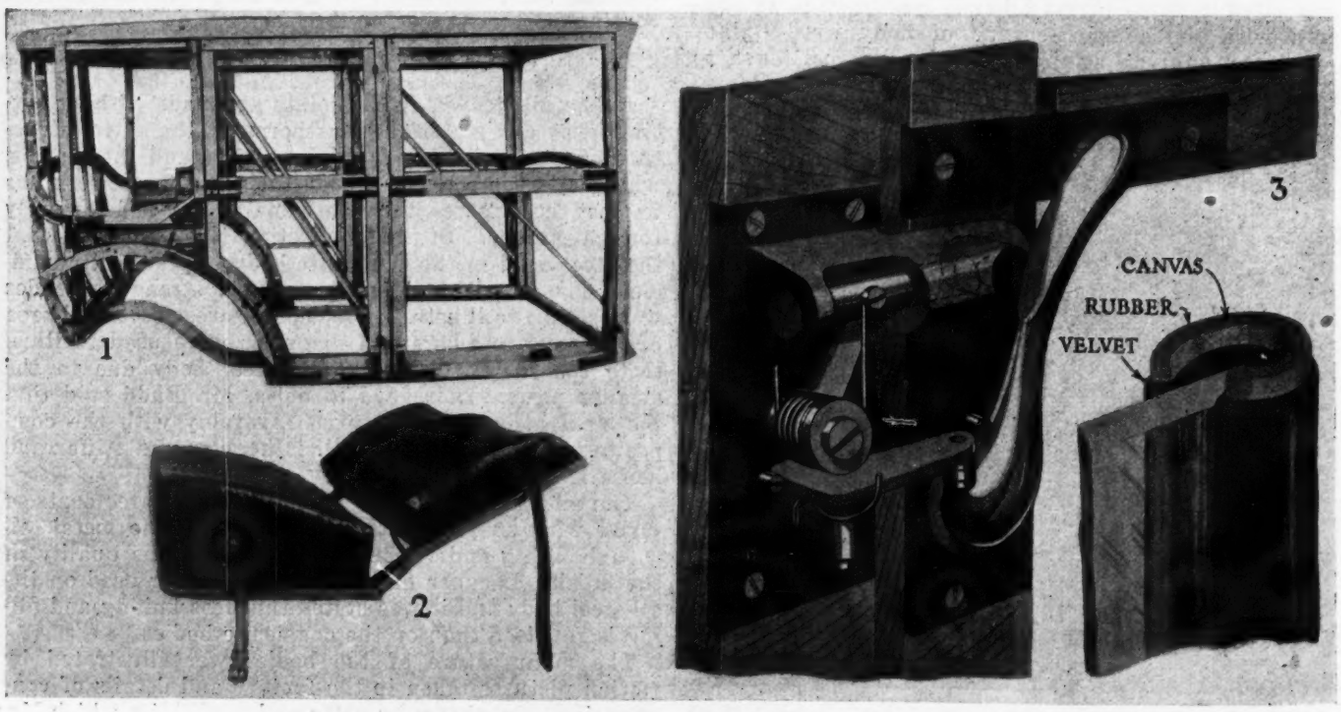
This type of body construction has been described in these columns previously. Briefly, it consists of a fabric covered wood framework which is sufficiently flexible to give in response to chassis distortion. Joints between the wooden members are effected by means of steel plates secured by bolts. To prevent squeaks, there is no wood-to-wood contact between the members, slight clearances being provided at the joints.

European experience indicates that both the cost and weight of the Weymann construction is about 75 per cent of the composite type. Less skilled labor and less special machine equipment is required, as the parts are simple. The exterior finish, of course, depends on the skill of the upholsterer. The bodies are assembled on the chassis in the European factories. Due to the fabric exterior, there is a virtual absence of resonance. Although the wood parts are smaller than in the composite body, they are not necessarily weaker, as their section is not reduced at the joints.

Mr. Judkins pictured the custom body builder as a creator of new designs and refinements, and as a source of special body supply for production chassis manufacturers. He pointed out the difference in methods made necessary by the relatively small quantities handled. He also mentioned the sales advantage that accrues to the manufacturer who offers custom-built jobs along with his standard line. He voiced the opinion that American body builders are ahead of their European colleagues and that there is little likelihood that a demand will develop here for bizarre effects.

He urged that more intimate relationships be established between the custom builder and the production chassis maker, and that particularly the custom builder be informed in advance of chassis changes affecting the bodies. Furthermore, he expressed the hope that some manufacturer in the near future would have the courage to build his car with a wider than standard tread.

In response to a question regarding the use of duralumin, he said that his company had experimented with it some years ago, but had given it up due to the difficulty of working. L. Clayton Hill told something of the great strides that have been made recently in the handling of duralumin and said that he knew of an experimental five-passenger phaeton body of this material which weighs 84 lb. without upholstery. He predicted that duralumin will increase as a material for body construction because of its extreme lightness.




1—*Frame of Weymann body.* 2—*Form of seat structure used by Weymann.* 3—*Lock designed especially for use on Weymann body*

# Research Men See Instrumentation Progress

*Apparatus for measuring noise, vibration, dilution and other factors are shown. J. A. C. Warner outlines recent advances.*

AN unusual display of laboratory equipment was the feature of the research session which constituted the first general session of the meeting. The interest of the meeting was demonstrated by an attendance of approximately five hundred and was shown further by the prevalence of notebooks. In some previous sessions the unfortunate editors of trade papers have been about the only people to make a show of taking notes, but in this case fully half of the attendance took notes in one form or another. H. L. Horning, president of the society, directed the meeting and detailed the activities of the research committee in a brief talk.

In preface to the discussion of these activities, Mr. Horning placed great stress on the need for better understanding of the psychology of motor car engineering, service and sales. For example, an owner may be greatly disturbed by a slight play at the steering wheel and at the same time be perfectly content with some other condition that is fundamentally wrong and dangerous. In a like manner, psychology plays a most important part in the consideration of gear noise and its remedy and is capable of application to practically every phase of the industry, its products and relations with its customers.

Antiquated courses in automotive engineering at the various universities and technical schools were criticized by Mr. Horning. In many cases, he said, the text books of 25 years ago are in use and modern developments in laboratory instrumentation are overlooked completely. In this industry cooperation has been developed to an unusually high degree and progress in materials and methods has been accelerated accordingly. Conceptions and theories of one year are obsolete in the next. Most schools and universities have overlooked these facts and have attempted to handle automotive engineering as a static subject. The society, with its research department and other facilities, stands ready to aid in the correction of this condition and is prepared to present the latest information on any phase. Progress of the whole industry is obstructed by these archaic courses and realization of the full utility of the automotive vehicle is delayed accordingly.

### Research Department Worth While

To illustrate the active value of the S. A. E. research department, Mr. Horning pointed out that this department has replied to 3000 engineering queries in the past year. Another indication is the bibliography on riding comfort which covers thousands of references and is practically an anthology of the automotive vehicle. A few of the subjects which are indexed are springs, shock absorbers, engine vibration, seat contour and balance. Five hundred copies of this bibliography are to be published and will be available for those interested in thorough-going knowledge on this subject.

Research instruments and apparatus formed the subject of a talk by J. A. C. Warner, assistant engineering manager of the society. As a basis Mr. Warner cited the four salient characteristics of research apparatus as set up by Clerk-Maxwell. These are as follows:

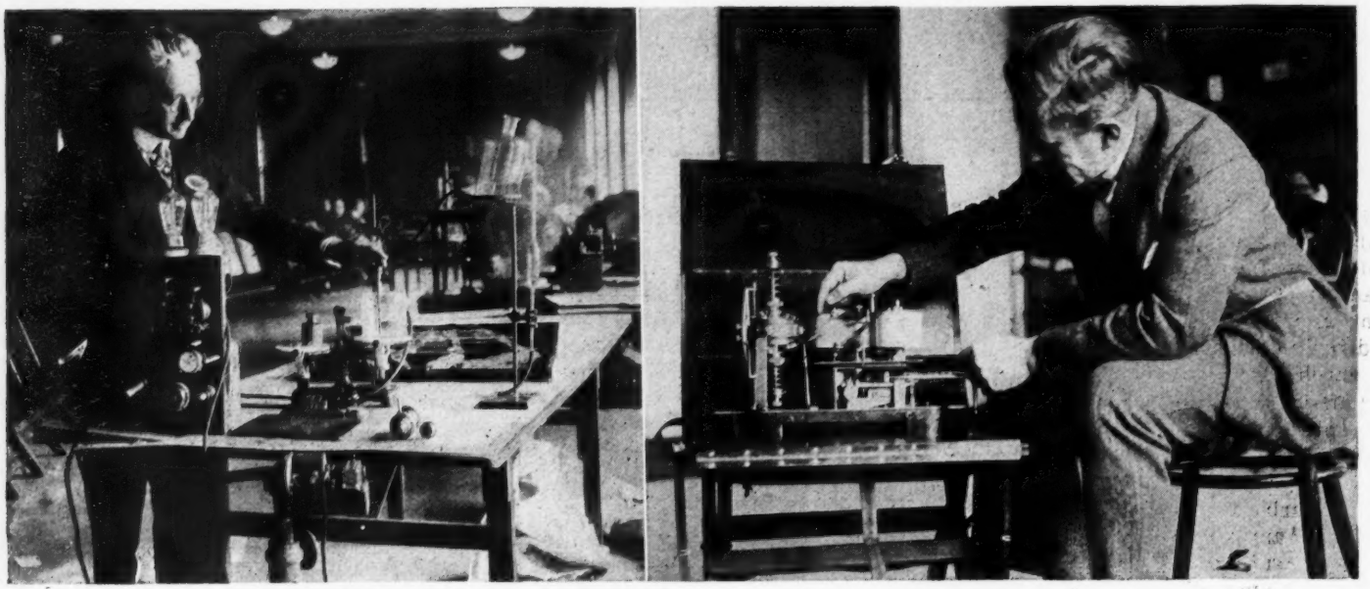
1. The construction of the instrument must be adapted to the specific use.
2. The instrument should be dependable.
3. Workmanship must be good to insure accuracy of related components and motions.
4. The cost should be reasonable and commensurate with the field of usefulness of the instrument.

The motion picture camera is rapidly becoming a very useful asset in the study of motions and relationships. Slow motion pictures allow very careful scrutiny of conditions that otherwise would be overlooked. Reproductions at the rate of 5000 per second are possible, although the camera capable of such speeds weighs 4 tons and is rather expensive.

Several types of instruments as represented by exhibits were discussed briefly by Mr. Warner and the meeting was followed by individual demonstrations. These instruments covered practically the entire field of automotive research and many of them are illustrated in this issue.

An optical demonstration by Floyd Firestone of the sound or noise measuring device developed at the University of Michigan formed an interesting part of the session. A microphone, such as is used in radio practice, is the receiving instrument, and the variations in the electrical circuit are registered by a milli-voltmeter. In testing roller bearings for silence at the Timken plant a certain standard is marked by a line on the voltmeter. The bearings are rotated in close proximity to the microphone and are passed as satisfactory if the indicator does not pass the standard line. This instrument also is

*J. A. C. Warner, who gave a talk on Research Instruments and Apparatus*



*Professor W. E. Lay of the University of Michigan and his exhibit, left. S. H. Woods and his track vertical accelerometer, another interesting device*

capable of application to rear axle, gear box and similar noise investigation.

The application of electrical and optical, as well as hydraulic agents to research and investigation work, was particularly noteworthy. Prof. W. E. Lay of the University of Michigan showed his fuel weighing device, in which an electrical circuit permits the measurement of fuel flow with great accuracy even when the draw is heavy and the amount of fuel small. Lights in the electrical circuits serve as indicators to facilitate the work of weighing.

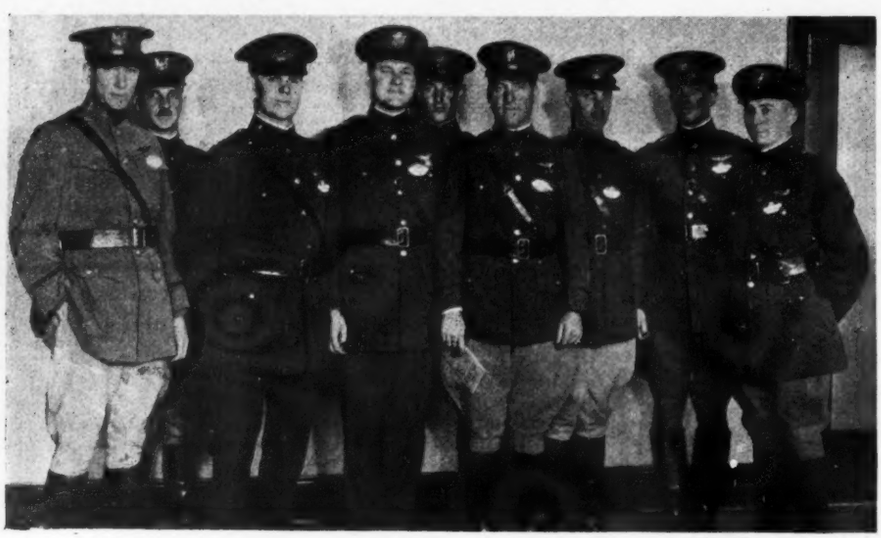
### Type of Instruments Used

In the stroboscopic group were the Elverson Oscilloscope and the Rotostat. Both of these instruments indicate conditions under high speed. Cylinder pressure conditions and their measurement were covered by the Farnsborough Engine Indicator, the Bureau of Standards indicator and a variation of the Okill gage which has been worked out at the University of Michigan. The Farnsborough instrument can be installed in an airplane and records made during flight. In this instrument, as well as the modified Okill, records are made by balancing external pressures against the instantaneous internal cylinder pressures.

### Bureau of Standards Activity

The automotive activity of the Bureau of Standards was represented by a dead center indicator of the hydraulic type, the James accelerometer, which has been described previously in AUTOMOTIVE INDUSTRIES, a fuel flow apparatus which shows the rate of flow optically, a pedal pressure indicator for brake testing and vibrometer for measuring rates of intense vibration by external application.

It is the latter instrument that the vibrations of the unit to be tested are synchronized with a vibrating reed in the instrument and the result is recorded on a dial. Two forms of gas analysis apparatus were shown, one being an improved type which operates on the potentiometer and the other the conventional Orsat arrangement.

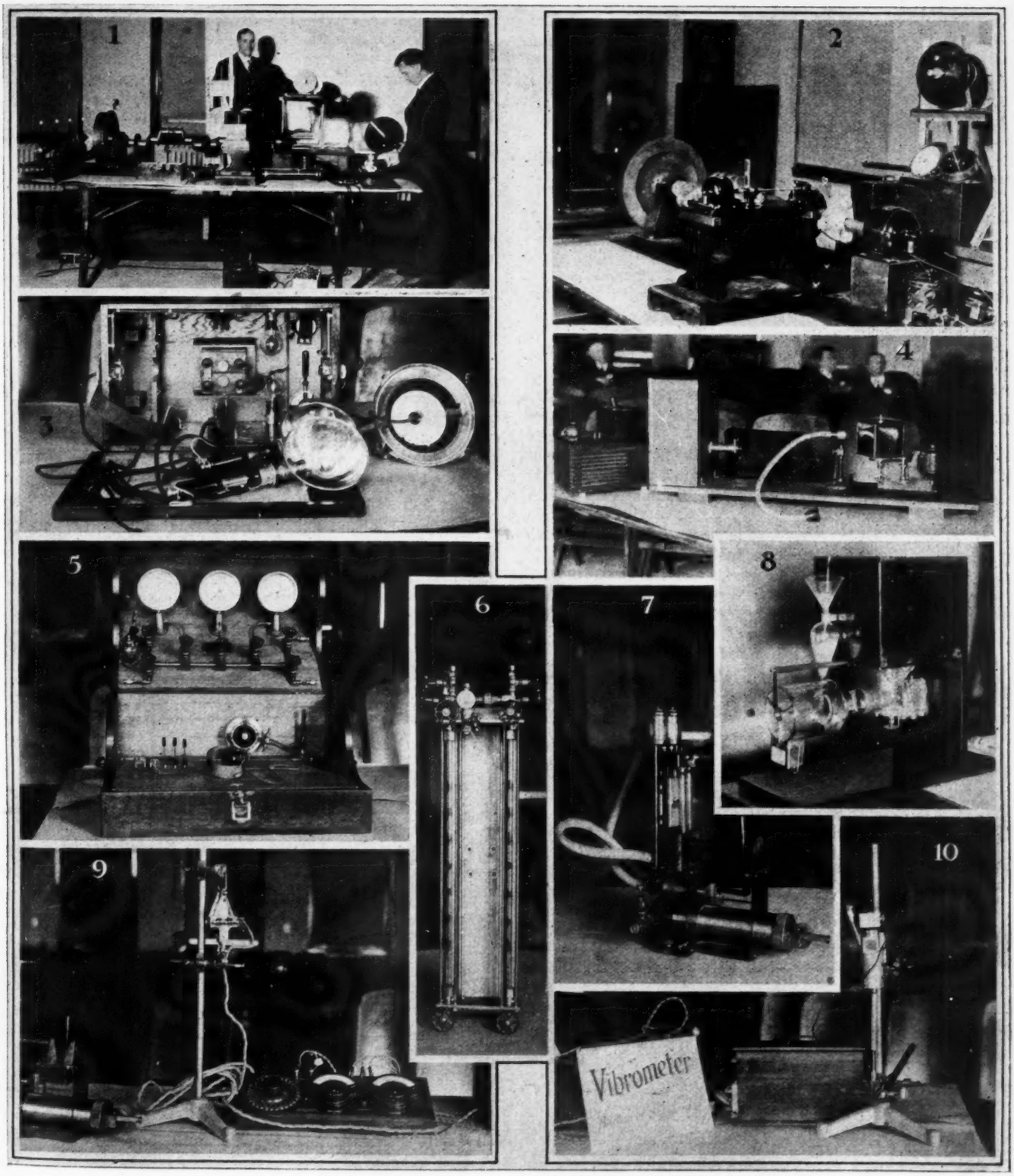


*Lieutenants Tillinghast, Mathews, Hurd, Johnson, Rich, Major Lamphier, Lts. Lyon, Minty and Ellis, who flew to the meeting*

A vertical accelerometer for measuring both shock and rebound of the chassis was shown by S. H. Woods of the International Motor Co., while B. J. Lemon, U. S. Rubber Co., presented a different apparatus for the same purpose.

A variety of European practice has been coordinated by H. L. Horning in the construction of an optical instrument for measuring vibration or wave action.

This instrument, which is called the phoneloscope, projects the wave form in suitable proportions on a screen and can be used for a variety of purposes, including the study of noises, the checking of the decalescent and recalescent points of steels, and several others. Two forms of viscosimeter applicable to the study of crankcase dilution were shown by the Bureau of Standards and were discussed in a later paper by T. S. Sligh, Jr.




*1 and 2—C. E. Summers and Mr. Lee with some of the devices they showed. 3—Elverson Oscilloscope. 4—Horning's Phoneloscope, which attracted much attention. 5—Engine indicator developed at the Bureau of Standards. 6—Fuel measuring device. 7—Volume indicator. 8—Summer device for testing air cleaners. 9—Pull Gage, Bureau of Standards. 10—A Vibrometer developed by the Bureau of Standards*

# Make Aviation Profitable, W. B. Stout Urges

***Tells how commercially successful planes can be built. New aviation engine announced by L. M. Woolson of Packard company.***

IN spite of newspaper agitation to the contrary, this country is making progress in the field of aviation, particularly on the commercial side. This was the outstanding thought brought out in the aviation session of Tuesday afternoon. The planes in the day and night transcontinental mail service fly more miles in every 24 hr. than do all of the commercial lines in Europe. This country leads in the development of all-metal planes, which are particularly adaptable to commercial service.

At the same time, the Packard Motor Car Co. has developed two sizes of aviation engine, the performance of which surpasses that of the renowned Liberty engine. Weight and bulk are considerably reduced, and at a given speed the power output is much greater. Henry Ford has shown his appreciation of the future of commercial aviation by placing a model plant and a well equipped landing field at the disposal of the Stout Metal Airplane Co., and interchangeable production of aircraft parts in metal jigs is already under way.

Mr. Stout reviewed his wartime experience with the development of thick-wing and all-metal planes and described the intermediate steps leading up to his present eight-passenger plane, which has a pay load capacity of one ton. He advocated the metal monoplane as the most desirable commercial type.

## Profitable Aviation Possible —*William B. Stout*

"AVIATION must be taken out of the charity class before it can be considered entirely successful from a commercial viewpoint," said W. B. Stout, president, Stout Metal Airplane Company. "Standardization of models," resulting in lower costs, and designs of planes to "earn the most money per fiscal year," were the chief means advocated by Mr. Stout to bring about the desired end.

"The motor car business was chaotic," Mr. Stout said, "until Henry Ford conceived the idea of selling a car 'as is.' Immediately standardization of production came, an industry was born over night."

Continuing, Mr. Stout said in part:

"From now on in America, an airplane to be commercially successful must be able to support itself in the air financially as well as mechanically.

"Why not apply the Ford plan to aircraft by making an airplane that is right, and sticking to one design? This would lead to a better airplane, developed month after month, a cheaper airplane, as production went on, and an airplane that could be serviced as the minimum cost.

"The first problem to be considered in an airplane is the engine," Mr. Stout went on, describing the plane recently developed by his organization.

"The airplane must have a cruising speed of 100 m.p.h., with the largest load that can be carried at this figure. The climb with full load must be at least 500 ft. during the first minute. This dictated wing areas, total weight and light weight, and set the first figures to 'shoot at.' We aimed at a 1-ton useful load with this performance.

"The best commercial airplane is the one that can earn the most money per fiscal year.

"The fundamentals of this airplane had to be:

"1. Maximum safety.
- "(a) Maximum reliability.
- "(b) Extreme structural strength.
- "(c) Extreme controlability.

"2. Most ton-miles per dollar.
- "(a) Low insurance rates.
- "(b) Maximum engine life.
- "(c) Quick serviceability.
- "(d) Minimum take-off and landing dangers.

"Irrespective of the airplane itself, it is still realized that 80 per cent of the safety of operation of any aircraft depends on the ground organization and the equipment.

"Safety is the first requirement for money-making with aircraft. This means safety on the ground, in the air, and under all conditions of wind, weather and vision.

"Earning capacity is a function of ton-miles in the air. The ship must be designed for an earning capacity that is secondary only to safety.

"An airplane on the ground is a financial white elephant. The ship must operate a minimum of 4 hr. a day in the air and eventually be able to do 20 hr. a day. Only on

*Left—W. B. Stout; center—Charles L. Lawrence, who presided, and L. M. Woolson of Packard, who told of the new aircraft engine*

this basis can aircraft pay dividends. The minimum number of hours per day spent in inspection and repairs, therefore, became imperative, and the type of structure dictated was metal.

"Every pound on the airplane is worth 7 cents per hr. in the air during a 6-hr. day. One hundred pounds of weight saved means $42 a day of increased earnings because of greater load-carrying capacity. For the carrying of loads at the highest cruising speeds no other airplane can compare with the monoplane, so this type was chosen despite initial sales resistance.

"More monoplanes would be used in America if the makers had the sales nerve to start.

"Thus we finally decided on the type: An all-metal internally-trussed Liberty-engined monoplane, carrying the maximum load at a cruising speed of 100 m.p.h. or better.

"By eliminating struts, wires, and all possible parts that do not lift when resisting air, our airplane showed a remarkable record in the wind-tunnel of the Massachusetts Institute of Technology. Built up mostly of box sections of duralumin riveted together, all the rivets are placed where they can immediately be inspected, inside the wings and out. The box sections were tested for their strength characteristics by outside testing laboratories, and from these figures the structural work proceeded.

"As completed, the airplane is a step ahead of previous monoplanes built by us in the last six years of experimental work, during which time some $500,000 has been spent.

"Weights have been reduced to the minimum, yet the structures are very simple and have the full factor of safety.

"The general design and performance features of the airplane in its present form are as follows:

| | |
|---|---|
| Span | 58 ft. 4 in. |
| Length, overall | 45 ft. 8 in. |
| Chord, maximum | 12 ft. 10¾ in. |
| Height, at rest | 11 ft. 10 in. |
| Wing area, sq. ft | 600 |
| Wing-tip clearance | 9 ft. 11 in. |
| Engine, Liberty, hp | 400 |
| Weight, per sq. ft., lb | 9.85 |
| Weight per hp., lb | 14.8 |
| Total weight, lb | 6017 |
| Weight, empty, with water, lb | 3638 |
| Useful load, lb | 2379 |
| Fuel, gal | 150 (900 lb.) |
| Oil, lb | 96 |
| Duration at cruising speed, hr | 5½ to 6 |

"The airplane is stable with the engine on or off. We can fly it 'hands off' on a calm day and cut off the engine without touching the controls. It then takes its own flying-angle without a tendency to go into a nose dive. When diving 'hands off,' the machine goes into a normal glide by itself. When landing in a side wind, it has no tendency to ground-spin, and, in taxying on the ground, the controls are extreme.

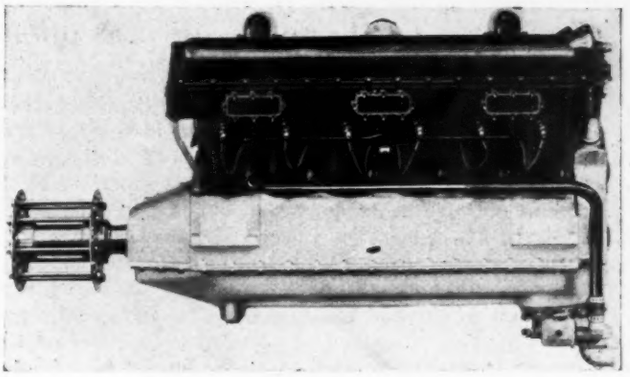
"The take-off with 2000 lb. of load is between 600 and 800 ft., depending on the wind. We have climbed more than a mile in 10 min., with 1 ton of mail. Characteristics of the airplane are increasing almost daily, the original figures being as follows:

| | |
|---|---|
| Maximum speed, m.p.h. | 115.0 |
| Cruising speed, at 1450 r.p.m., a.p.h. | 96.8 |
| Landing speed, m.p.h. | 52.0 |

"These figures are with the Air Mail useful load of 2000 lb. The airplane easily carries 2700 lb., with a corresponding increase in the take-off and decrease in the climb.

"Further developments are beginning to accrue to us. Our plan tentatively is to operate our own airplanes on subsidiary airlines between given cities.

"It has been said by many persons that commercial airplanes cannot pay. As they have been operated in the past they could not pay, no matter what might be the air-



*Packard's new aircraft engine which develops 800 hp. at 2000 r.p.m.*

plane. Financial success is a matter of management and of working from facts.

"When we fly at night between civic centers with airplanes that safely carry passengers, freight, collateral, money, antiques, films, and the like, and the ships can remain in the air 20 hr. out of every 24, we shall carry passengers cheaper than first-class railroad fare and shall make money by carrying goods at express rates at a profit. It is purely a question of business men putting business fundamentals into airplane operation, a thing as yet undone.

"A great deal of faith and hope still remains to be expended, in actual cash and energy, before the charity side will be overcome and aviation really will become self-supporting.

Precedent, except as founded on fundamental theories and practice which could be analyzed, was discarded in the design of the two new Packard aviation engines. Experimental laboratory set-ups were made to represent the conditions pertaining in practically every detail and these were combined with the most careful mathematical analysis to determine the characteristics of each feature of the design. This work has convinced Packard engineers that aviation engines up to 3500 hp. with a low weight to power ratio are perfectly feasible. The new 1500 cu. in. engine develops 500 hp. with a weight of 720 lb., as compared to the Liberty's output of 400 hp. and 860 lb. weight. The bulk is reduced considerably and each basic outside dimension is less. The 2500 cu. in. engine develops 800 hp. with a weight of 1113 lb.

These engines represent a great advance in design practice and will be described in detail in an early issue of AUTOMOTIVE INDUSTRIES. Welded steel cylinders are topped by a common aluminum valve housing which reduces complication and improves performance and service. Both engines are the twelve-cylinder type and are designed to operate in the conventional way or in the inverted position. The latter method offers some apparent advantages, particularly in improved vision and better propeller location, along with the possibility of using propellers of larger diameter. Exhaust valves are oil cooled, the regular engine lubricant being used. These designs were covered by L. M. Woolson of the Packard Motor Car Co. in his paper, "Recent Advances in Aircraft Engine Design."

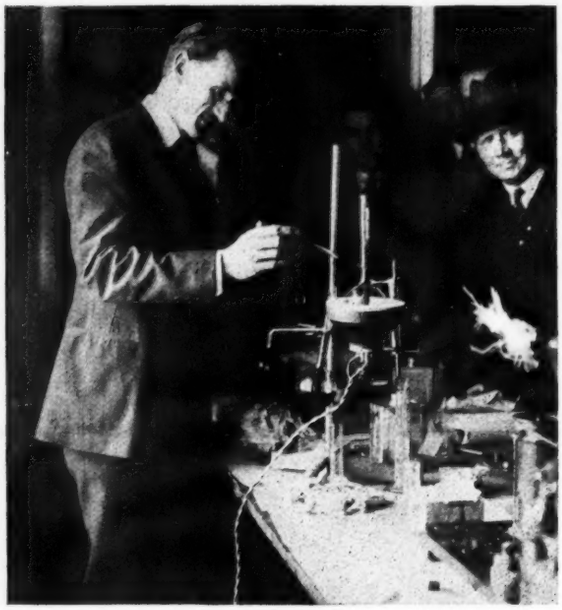
# Bureau of Standards Tells of Dilution Work

***Government efforts outlined by T. S. Sligh, Jr., and S. W. Sparrow. G. A. Round discusses dilution and other oil contamination.***

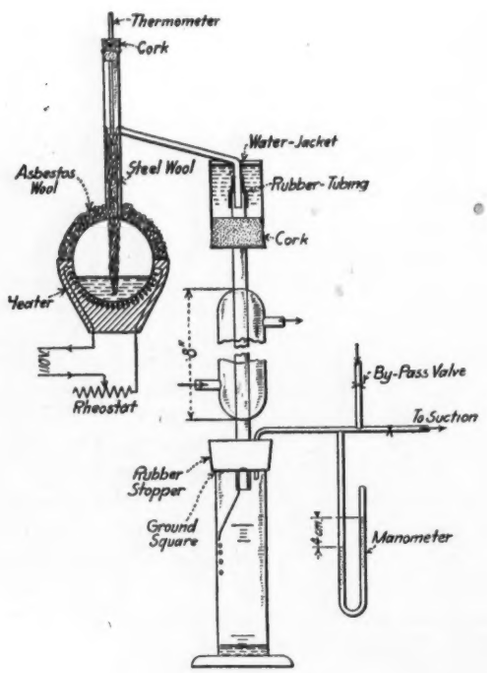
CRANKCASE dilution and kindred subjects took their semi-annual licking at the lubrication session. The vacuum distillation transition method of determining crankcase dilution, which has been developed recently by the Bureau of Standards, was described in a paper by T. S. Sligh, Jr., who also gave a demonstration of its application. The nature of solid material collected, its effects and methods of eliminating it, were discussed by G. A. Round, Vacuum Oil Co. Progress made by the Bureau of Standards in its investigations of the dilution problem was related by S. W. Sparrow.

The transition method of measuring the amount of crankcase dilution provides an accurate and reasonably fast means of making the determination. It is based on the assumption that an abrupt change will take place as the distillation proceeds from diluent to oil. As the test proceeds the readings of vapor temperature and amount of condensate is plotted as shown in the accompanying figure. Where the temperature rises abruptly, the curve straightens out and a straight line is drawn through it. Distillation of the diluent is assumed to be complete at the point the curve starts to bend away to the right from this straight line.

The precision of the test is about 0.5 per cent, as the results can be reproduced with this accuracy. The determination may be made without plotting the results by computing the differences between successive temperature readings. It will be found that these differences increase rapidly to a maximum at the transition point and the distillation of the diluent is assumed to be complete when the numerical value of the differences start to decrease after reaching this maximum. This method is not as accurate as the graphical means, but it will give results within 1.0 per cent. A faster but less accurate method is to let the condensate drain through a capillary tube into the graduate. This really depends on a change in viscosity of the condensate, as a reading is taken on the graduate when there is an abrupt rise in the level in the capillary which indicates a change in viscosity. In this case the test is carried on at atmospheric pressure.



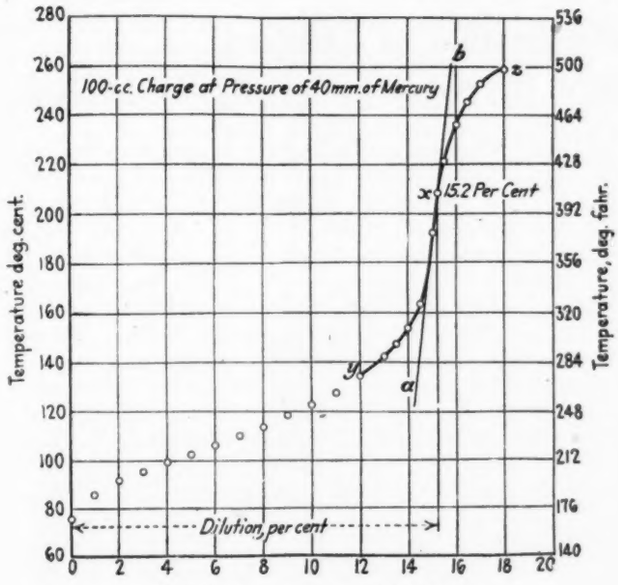
*T. S. Sligh, Jr., and his apparatus at the Lubrication Session*




The apparatus is shown in the accompanying drawing. The sample used is 100 cc., as this makes it possible to read percentage directly from the graduate in which the condensate collects. The heat input should be maintained constant at about 150 watts and the sample should not contain more than 0.2 per cent of moisture. Greatest accuracy is obtained when the end point of the fuel and the initial point of the oil are at least 50 deg. Fahr. apart. The water may be separated from the sample by letting it stand for 24 hr. and then taking test quantity from top.

The need for some means of removing the solid material from the crankcase oil, due to its clogging effect in the oil passages, was emphasized by Mr. Round, who said that some filtering device is necessary for this purpose, as the impurities are so finely divided that no screen would remove them. He recommended the use of screens of 25 to 40 mesh, as they can be depended on only to remove lint and other larger impurities, while the finer meshes clog quickly and also prevent the passage of water, with resultant freezing up in cold weather.

He urged that screens be designed for self cleaning and that the oil enter them either horizontally or in a vertically upward direction. A sediment pocket should be provided under them to collect the material which falls off of them.




*Distillation cure of diluted oil*

High crankcase temperatures are only effective in reducing dilution when proper ventilation is provided. In a four-cylinder engine, the pumping action is quite large, and this was advanced as a reason why dilution was less serious in this type of engine than in a six, where the pumping action is comparatively small.

Digests of the papers presented by Messrs. Round and Sparrow follow:

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# Foreign Material in Used Oil

## —*G. A. Round*

MR. ROUND said that the foreign materials in used oils are always the same, but quantities of the different elements present vary considerably in different samples. These impurities include oxidized oil, carbon, metallic particles and road dust, with occasionally some fibrous material or lint.

Statements have been made that used crankcase oil sometimes contains as high as 25 per cent of foreign material, but the author feels certain that such samples are not representative of the oil circulated through the bearings; they must have been taken from the drain plug as the contents of the reservoir were drained off.

Analyses of a larger number of samples of used oil, taken from passenger cars and motor trucks operating under widely varying conditions, show that the entire quantity of insoluble material will seldom exceed 1.25 per cent, while the average is less than 0.50 per cent. Of this amount, about one-fifth, or 0.1 per cent of the whole, usually comprises metals and road dust, the latter varying considerably in its proportion with the conditions of operation.

If the temperature is very high (over 600 deg. F.) some cracking takes places, forming carbon. Carbon so formed, however, is very fine and must not be confused with the deposits that often build up inside the piston heads. These are caused by the gradual and progressive stewing down, or oxidizing, of the oil into a hard mass. Such deposits, however, if any of them flake off and drop into the oil, are separated very quickly by gravity and the action of the oil screen.

Because of its character, oxidized oil tends to collect any finely divided material that may be contained in the oil, including the carbon caused by cracking or coming from the blow-by in the form of soot, fine metal particles, and some, if not all, of the road dust. Collectively, this material is opaque and only a very small amount, less than 0.05 per cent, is sufficient to make the oil look black.

Examination of samples under the microscope tends to support the "conglomerate" theory. As a further check on the oxidized oil's forming the bulk of the so-called carbon, if a sample of used oil is treated with chloroform, a large part of the "carbon" will be dissolved. It is also interesting to note that, as the oil becomes diluted by fuel, the various groups tend to coalesce and to become more readily separated from the oil by gravity or by centrifugal force.

### Some Foreign Matter Not Abrasive

From the standpoint of promoting wear, it is obvious that no ill effects need be expected from the material under discussion, for the individual particles are too fine to take effect with the normal oil-film thickness, even were they of abrasive character, which is not the case, insofar as the carbon particles from soot or cracking are concerned. The presence of such material in engine lubricating oil is, nevertheless, undesirable for other reasons.

Analyses were given in the paper of oil samples taken from the crankcase of two trucks. The analysis of one sample—which was taken from the circulating system, not from the drain—showed a total insoluble content of 0.75 per cent, 0.20 per cent comprising metal and road dust. The other sample was found to have a total insoluble content of 1.2 per cent, of which approximately 0.6 per cent was road dust, and it is significant that this sample was obtained as the crankcase was being drained.

Very fine particles of dust in the oil can be studied in photomicrographs. The presence of this extremely fine dust in the lubricating oil seems to indicate that the grit drawn in through the carbureter has been more or less pulverized by the piston and ring action, while at the same time promoting wear of these parts. The results of the "wear test" also indicate that the ground-up particles are coarse enough to cause wear of the bearings, if the lubricating oil becomes thinned out.

In Table 3 are given the results of some tests made to determine the effectiveness of an air cleaner in reducing the amount of abrasive material in crankcase oil. These results indicate that such a device is helpful.

*G. A. Round, left, and S. W. Sparrow, who read papers at the Lubrication Session*

*Table 1—Analysis of Insoluble Material Taken From an Oil Sample From the Engine on the Wear Test in Which Dust Was Fed Into the Carbureter Intake*

| Material | Per Cent |
|---|---|
| Oxidized oil | 15.5 |
| Carbon | 7.7 |
| Iron | 58.2 |
| Silica and silicates | 18.6 |
| Total | 100.00[a] |

[a] This total represents only 0.96 per cent of the total sample and was insoluble in petroleum ether.

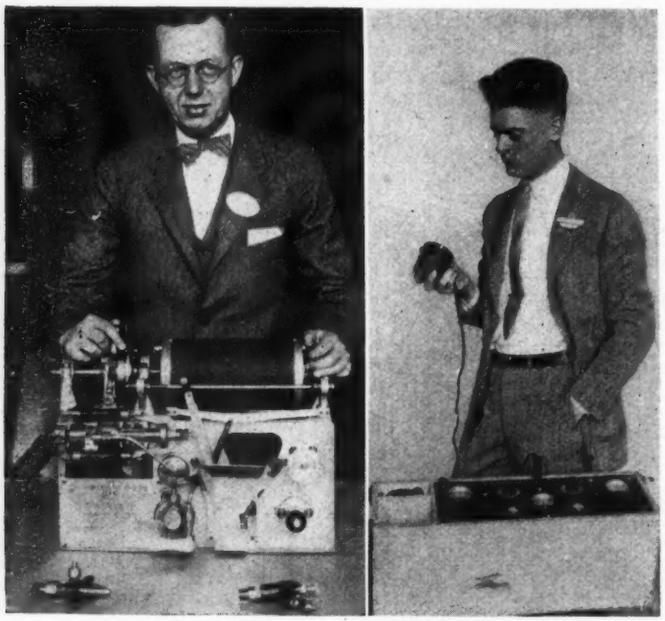
*Table 2—Analysis of Insoluble Material in a Sample of Oil Used for 30 Days in a Motor Truck in Suburban Service Near New York City*

| | |
|---|---|
| Flash point | 220 deg. Fahr. |
| Used oil analysis | |
| Material insoluble in petroleum ether | 0.97 per cent |
| Flash point | 220 deg. Fahr. |
| Pour test | 0 deg. Fahr. |
| Viscosity at 210 deg. Fahr. | 50 sec. |
| Fuel | 6.9 per cent |
| Water | Trace |
| Analysis of Material insoluble in petroleum ether | |
| Oxidized oil | 21.4 per cent |
| Carbon | 65.6 |
| Iron | 12.4 |
| Silica | 0.6 |

*Table 3—Analysis of Samples Taken from Units Operating with and Without Air-Cleaners*

| Sample No. | Fuel, Per Cent | Insolubles, Per Cent | Road Dust, Per Cent |
|---|---|---|---|
| 1[a] | 1.2 | 0.030 | 0.001 |
| 2 | 1.8 | 0.500 | 0.015 |
| 3[a] | 1.0 | 0.015 | 0.001 |
| 4 | 2.0 | 0.430 | 0.010 |
| 5 | 1.7 | 0.540 | 0.015 |
| 6 | 3.3 | 0.550 | 0.013 |
| 7[a] | 1.6 | 0.240 | 0.006 |
| 8[a] | 3.6 | 0.340 | 0.008 |
| 9 | 3.5 | 0.370 | 0.012 |
| 10[a] | 1.7 | 0.280 | 0.006 |
| 11[a] | 3.0 | 0.350 | 0.009 |
| 12 | 1.6 | 0.460 | 0.016 |

[a] These samples are from engines equipped with air-cleaners. The results indicate that air-cleaners tend to reduce the dust content of the crankcase oil.



*R. Insley with Farnsbrough engine indicator. Left—F. Firestone and his sound loudness tester*

# Investigation of Dilution

## *By S. W. Sparrow and J. O. Eisinger*

RECENT cooperative fuel research was reported on by S. W. Sparrow and J. O. Eisinger. This research, which is being carried on at the Bureau of Standards, is being financed jointly by the S. A. E., the American Petroleum Institute and the N. A. C. C. Earlier work has been reported on at previous S. A. E. meetings. The "steering committee" in a resolution adopted with reference to the carrying on of the investigation from July, 1924, to July, 1925, recommended:

"First, that the factors contributing to crankcase oil contamination be investigated; second, that the factors contributing to easy starting be investigated; third, that an investigation of vaporization be made to coordinate design of internal combustion engines and the volatility of fuel."

In the paper an analysis is made of the probable mechanism of the phenomenon of crankcase dilution, for which credit is given to Dr. Dickinson of the Bureau of Standards, and the theory evolved is subjected to the test of a comparison of results that might be predicted from it with actual test results. According to the theory referred to, the two factors that determine whether or not there will be crankcase dilution are the dewpoint of the mixture supplied to the cylinders and the temperature of the cylinder walls. Dilution, of course, is most serious during the starting and warming up periods.

The amount of fuel which must be introduced into the cylinder to furnish sufficient fuel vapor to form a combustible mixture depends upon its temperature and its volatility. The only heat the charge is likely to receive in the cylinder itself is that derived from compression. Leakage from the combustion chamber is important because of its influence on the amount of heat that is developed. Some of the factors which influence this leakage were investigated by rotating an engine, mounted in a car, at various speeds and throttle openings and measuring the compression pressures in the cylinders.

It had been anticipated that the best piston seal and, therefore, the highest compression pressure, might be obtained with an oil of rather low viscosity. In these tests, however, the highest pressures were obtained under conditions which made the oil upon the cylinder walls most viscous. The lowest pressure was obtained when gasoline was admitted into the cylinder and the highest water jacket temperature and the least viscous oil were employed. The highest pressure was obtained when gasoline was not allowed to enter the cylinder and the lowest jacket water temperature and the most viscous oil were employed.

In the earlier stages of this research it was found that there is a close relationship between fuel volatility and the rate of dilution. This is in entire accord with theory. The dewpoint temperature of the fuel-air mixture depends on the fuel volatility, though not directly on the distillation end-points; therefore, the less volatile the fuel is, the higher will be the jacket water temperature required to prevent dilution or, conversely, the greater will be the amount of dilution under the same operating conditions.

In a previous report, it was pointed out that the rate of crankcase oil dilution varies almost directly with the fuel-air ratio. This would be expected, since the dewpoint temperature increases with fuel content as well as with decreased fuel volatility.

In the same report it was shown that the temperature, and therefore, supposedly, the degree of vaporization of the incoming charge, have much less effect on the rate of crankcase oil dilution than many had supposed. This,

too, agrees with the theory. The dewpoint temperature does not depend upon the intake temperature; hence, the temperature of the cylinder walls at which dilution stops should not depend primarily on intake-charge temperature, nor should dilution depend upon it directly. From this analysis, supported by the data derived from experiments, the conclusions reached are summarized as follows: Under average operating conditions, crankcase oil dilution

1. Depends primarily on the average temperature of the cylinder walls.
2. Is likely to reach an equilibrium value if starting periods are not too frequent.
3. Depends directly on fuel volatility.
4. Is directly dependent upon the average fuel-air ratio.
5. Does not depend much upon the piston temperature.
6. Is not dependent much upon the charge temperature or the degree of vaporization.

By using oil as a cooling medium, the effect of jacket temperatures as high as 100 deg. Cent. (212 deg. Fahr.) has been investigated. At this temperature the amount of dilution was extremely small and the viscosity of the oil actually increased during the run. It should be noted that, in the absence of dilution, the normal behavior of oils is to increase in viscosity with use.

Recently some experiments have been made to investigate the effect upon dilution of reducing the compression ratio.

In the experiments referred to, the compression ratio was about 2.0, as compared with the normal ratio of about 4.0. A marked improvement was shown as regards dilution, with the lower compression, but this certainly is not due solely to the change in pressure, as other changes occur at the same time. Thus, for instance, with the lower compression ratio a much greater volume of exhaust gas remains in the clearance volume, which results in a higher initial temperature at the beginning of the compression stroke.

Some further experiments were made bearing upon the effect upon dilution of certain changes in pistons and rings. There was a marked increase in dilution when operating entirely without rings on the pistons, but there was no appreciable difference in the results obtained with one ring and three rings, respectively. Operating with very loose pistons (their normal diameter having been reduced by 1/32 in.) resulted in no appreciable increase in the rate of dilution.

It is evident that, in a type of service involving frequent starts and comparatively short periods of continuous operation, the amount of diluent added to the oil will be large and, unless the diluent is eliminated at a fairly rapid rate, the oil speedily will become of too low a viscosity to give satisfaction. It is of importance, therefore, to consider the factors that influence the rate at which diluent is eliminated from the crankcase oil.

It was found that, after the crankcase oil of an engine had been purposely greatly diluted, there was no further increase in dilution when aviation gasoline was substituted for the ordinary commercial gasoline previously used. Attention is called to the observation made by Neil MacCoull, that an increase in the crankcase oil temperature reduces the rate of dilution, which, it is stated, can be due only to its effect upon the rate of elimination of diluent.

It is felt that investigation of the subject of dilution has been carried to such a point that diminishing returns might be expected in case of further work, and it is therefore proposed to devote the rest of the year to an investigation of other phases of oil contamination and of the starting problem.

# Air Cleaners Get Road and Laboratory Tests

***C. E. Summers describes basic characteristics of dust particles.***

***A. H. Hoffman outlines the most recent California researches.***

LABORATORY and road experience were combined by the papers presented in the air cleaner session. Mr. C. E. Summers brought a great amount of apparatus from Dayton to show the basic characteristics of dust particles, particularly as regards suspension characteristics. Tests made with models of the same specific gravity, but varying in size in the ratio of 3 to 1, demonstrated that the larger particles settle more rapidly than the smaller. The mathematical explanation of this result is that the areas of particles vary as the square, whereas the weight varies as the cube of the dimensions. In conjunction with his paper on the physical characteristics of road and field dust, Mr. Summers demonstrated the Champion air cleaner, which was connected to a blower apparatus. His paper is digested as follows:

## Road and Field Dust

### —*By C. E. Summers*

Chemical analyses of road and of field dust show that samples taken from different States vary considerably in composition. Ninety to 98 per cent by weight is mineral matter. Road-dust particles of different chemical composition do not differ materially in abrasive character. Fig. 1 gives the chemical analyses of air-floated field-dust caught in air-cleaners operating in the States indicated. In these samples, more than half the mass is silica, with varying quantities of oxides of iron and aluminium, the remainder being small amounts of carbonates of calcium and magnesium. Organic matter rarely exceeds 10 per cent in field dust, and forms a still lower percentage of road dust.

The specific gravity of dust particles varies somewhat, but it is about 2.5, which corresponds very closely to that of quartz. Contrary to popular opinion, therefore, dust is not in itself a light substance. The ability of dust to float in the air for a length of time is a function of its size, rather than of its specific gravity. This is due to the greater ratio of area to volume as the size of the particle grows less. The volume of a cube or a sphere varies as the cube of the lineal dimensions, while the surface varies as the square of the dimensions. For very small particles, the viscosity of the air is an important factor.

Dust particles in all soils vary from the coarsest material down to tiny crystals that are just visible with a microscope of 500-diameter magnifying capacity, and no doubt even smaller particles are present. The coarsest

particles that an automobile engine may draw-in, when following closely or passing another car, may be 0.010 in. in diameter or even larger. Particles still in the air 2 min. after a vehicle has passed are approximately 0.00025 in. in diameter. The average particle-size of the bulk of the dust is about 0.001 in. in diameter.

The abrasive action of dust depends upon its amount and coarseness, the material and the speed of the rubbing surfaces, and lubrication. It is evident that, to scratch the surface, the dust particle must be greater in diameter than the thickness of the oil-film. Where dust is present, it is always noted that more wear exists at the top than at the middle or the bottom of the cylinder. Measurements made on a number of test cars (without air cleaner) that were operated on paved and on gravel roads around Dayton, Ohio, serve to show that under average good conditions, a cylinder wear of 0.002 to 0.003 in. can be expected in 10,000 miles. Some less authentic figures collected indicate that cars operated altogether on unpaved roads in the Southwest show an average wear in cylinder diameter of 0.005 in. per 10,000 miles.

| | | TEXAS | ALABAMA | IOWA | CALIFORNIA |
|---|---|---|---|---|---|
| Silica | $Si\,O_2$ | | | | |
| Iron Oxide | $Fe_2\,O_3$ | | | | |
| Aluminum Oxide | $Al_2O_3$ | | | | |
| Calcium Carbonate | $Ca\,CO_3$ | | | | |
| Magnesium-Carbonate | $Mg\,CO_3$ | | | | Trace |
| Organic Matter + Chem. Comb. $H_2O$ | | | | | |
| Moisture | | | | | |
| Per Cent | | 10 20 30 40 50 60 70 80 90 | 10 30 50 70 90 | 10 30 50 70 90 | 10 30 50 70 90 |
| Specific Gravity | | 2.5 | 2.4 | 2.5 | 2.5 |

*Some of the results obtained after an analyses of air cleaner content*

Four cars with air cleaners were driven through Oklahoma and Texas on a test run. They were driven close together, the second being kept within a few yards of the leader, and the roads were dusty. The air cleaner of the leading car caught 0.13 oz. of dust, that of the second, 3.62 oz. or about 27 times as much. Considerations of average wear and many measurements of actual dust caught led the author to the conclusion that a total of ½ oz. of dust is caught by the average car per year when operated principally on paved roads and 2.0 oz. when operated largely on unpaved roads.

As regards the requirements made of an air cleaner for passenger car engines, the author says that it must be high in cleaning efficiency, not reduce the power or economy of the engine (which means that the restriction must be small and constant) and fit directly into the carbureter, thus avoiding the complication and restriction of long conduits and bends. It should require attention not oftener than once a year and must be neat, compact, light and inexpensive.

Considerable equipment is required to make complete tests of air cleaners. A frequent mistake in testing is to use fine sand or other material that is much coarser than the average road dust, which will lead to results giving an exaggerated idea of the cleaning efficiency of the device. The opposite mistake, of using dust much finer than average road dust, is also made, and gives distorted notions of the effectiveness of air cleaners.

*C. E. Summers, who read two of the most interesting papers at the meeting*

## Air Cleaners on Trucks
### —*By A. H. Hoffman*

ROAD tests of a number of commercial air cleaners were described in a paper entitled "Air Cleaners on Trucks in Service," by A. H. Hoffman of the University of California. The tests were carried out on Class B military trucks in service in road building by the California State Highway Commission. Very elaborate preparations were made to determine accurately the effect of the air cleaners on the wear of the different parts of the engine that might be expected to be affected most, but the fact that the primary object was to move earth in maximum amount at minimum cost and the air cleaner test was a secondary consideration vitiated the value of the results obtained to a certain extent.

It was found that the piston diameters in most cases were larger at the end of the test (over 2000 miles) than at the beginning. The reason for this is thought to be that the growth of the cast iron in the pistons, which were new when the test started, exceeded the wear.

In several cases the cylinders wore more in the direction parallel to the piston pins than at right angles thereto. This is believed to have been due to lack of proper alignment of the several parts. The wear of all of the engines, even those not equipped with air cleaners, was considerably less than is often found in trucks operating in dust no more dense than was encountered by the trucks in this test. This is accounted for by the fact that the crankcases were drained once a week during the first two months, and at about ten-day intervals

during the remainder of the time. Thus the accumulated dirt was promptly removed and the viscosity kept high.

### Representative Results

One of the air cleaners, which is believed to give the most representative result as to the amount of dust encountered, caught 188.1 grams in 2550 miles, or 0.0761 gram per mile.

The reduction in wear due to the use of air cleaners was most noticeable in the case of piston rings. Thus the average wear on the width of the top ring for the two engines having no air cleaner was 0.0053 in., while the average for the engines having an air cleaner under the hood was only 0.0022 in. The average loss in weight of the top rings was 7.229 grams for the engines without air cleaner and 2.071 grams for the top rings on the engines with air cleaner under the hood. The wear on the second ring was reduced by the air cleaners from 3.238 to 0.939 grams and on the third ring from 2.352 to 0.754 grams.

Further reports of the air cleaner tests at the University of California were presented by Prof. A. H. Hoffman, who dealt with this subject at the last Spring Lake meeting. The records of dust collected in the cleaner installed on six trucks over a period of six months are tabulated below. As indicated, most of these reports are corrected to the absolute value as based on the efficiency test for the particular type of cleaner.

Mr. Hoffman said that in practically every case the average wear with air cleaner equipment was appreciably less than in the engines with no air cleaner equipment.

He stated that the most desirable cleaner combines high cleaning ability with low restriction and that the cleaner should be mounted as high as possible under the hood and as near as possible to the center line of the hood. Much greater efficiency is obtained by turning the opening of the cleaner toward the rear.

Another outstanding requirement of a satisfactory cleaner is dependability and continuation of original conditions. In the California tests, practically no cleaner has demonstrated its ability to continue as a real cleaner through long periods of actual use.

*Table No. 1—Dust per Mile*

| Car | Miles | Dates | Dust Encountered, Grams | Dust per Mile, Gram | Intake Placing and Height, Inches |
|---|---|---|---|---|---|
| Dodge Touring 1923 | 3,646 | 12/29/23 to 12/16/24 | 10.15* | .00277 Northern California | Facing forward under hood 35 |
| Ford Truck 1923 | 2,153 | 6/5/24 to 10/9/24 | 12.86* | .00598 Around Davis, Cal. | Facing forward under hood 42 |
| Ford Touring | 754 | 5/10/24 to 8/1/24 | 0.73* | .00097 Weather damp; near Grinnel, Iowa | Facing sidewise under hood 39 |
| Liberty 3½-Ton Truck | 2,800 | 4/1/24 to 10/1/24 | 195.9* | .06996 N. W. California road construction | Facing forward under hood 46 |
| Liberty 3½-Ton Truck | 1,983 | 4/1/24 to 10/1/24 | 160.52** | .08095 N. W. California road construction | Facing forward outside of hood 48 |
| I. H. C. 1-Ton Speed Truck | 6,375 (87 per cent on paving) | 3/12/24 to 11/13/24 | 6.8* | .00106 University Extension, California | Facing sidewise under hood 47 |

*Corrected to basis of 100 per cent efficiency air cleaner.
**Actual dust caught, uncorrected for cleaner efficiency.

# Debate Proves Vapor Cooling a Live Topic

***Engineers' views differ widely on various methods of cooling. N. S. Diamant describes possible arrangements of the steam type.***

DISCUSSION following N. S. Diamant's paper on steam cooling systems indicated a live interest in the possibilities of this method of cooling. The important advantage of this type of system is that engine temperature is maintained within narrow limits regardless of atmospheric tempertaures. Mr. Diamant's paper was of a descriptive nature, covering the various possible arrangements of a steam cooling system.

It was pointed out that a steam cooled engine can be operated at any desired temperature by varying the pressure either above or below atmospheric, or by adding some material such as alcohol to change the boiling point of the water.

Steam cooling reduces the amount of heat needed on the intake manifold to secure vaporization and hence improves volumetric efficiency. The higher cylinder wall temperatures are also a factor tending to eliminate diluent from the oil. The warming up period of the engine is reduced and the entire cooling system is of decreased size.

Some doubt was expressed of the ability of steam systems to cool such highly heated points as the valve seats, due to a lack of forced turbulence of the water past these surfaces. In answer to this it was said that the boiling action provided the necessary turbulence and that no difficulty was experienced from this cause.

*Prof. A. H. Hoffman talked on Air Cleaners and N. S. Diamant on steam cooling systems*

# Mystery Car, New Models and Trade Days Feature Opening of Chicago Show

***Price changes absent during opening days. Executives more optimistic over general business outlook. New eight shown.***

A FEW new models, considerably better sales representation at car booths during the trade days and the exhibition of a new mystery car at the Hotel Auditorium were the outstanding features of the Chicago Silver Anniversary Show which opened to the trade Friday, Jan. 23, and to the public Saturday evening, Jan. 24.

The car exhibits for the most part duplicated the New York showings. Reo had on exhibition for the first time the new sport roadster which was announced three weeks ago; a straight eight was presented by Roamer; the Bauer taxicab with its novel door construction made its bow; a Dodge taxicab was shown; and Elcar exhibited a new five-passenger sedan on an eight-in-line chassis. Otherwise mechanical novelties were absent from the big Western show.

As announced last week in these columns, a mysterious model without name, price or visible manufacturer is being shown in the Auditorium Hotel. The new job has a wheel base of 103 in., carries a four-cylinder engine and has graceful body lines. Thus far no announcement is forthcoming as to the interests behind this car, but it can be said on good authority that it has the backing of well known Detroit automobile men and that it has been designed to sell in a low price class despite its complete equipment and modern lines.

Car manufacturers took advantage of the trade days more fully in Chicago than in New York. Profiting by mistakes made in the East, most of the car companies had their booths well manned with salesmen on Friday and Saturday, while factory representatives were present in many instances. As a result the dealers who came to view the new cars and talk business were not disappointed as many of them were when the Eastern exhibit was held.

In addition to bringing a large number of automobile dealers to the show, trade days drew a good turnout of accessory and parts dealers with the result that some spot business was transacted in that division. Part of this business, talks with exhibitors revealed, was developed from contracts made during the New York show.

There was a feeling of general satisfaction in all branches of the show over the trade day interest and while there were various suggestions as to how the feature might be improved in later years it was agreed that trade days should continue as a permanent institution of the national shows.

### Prices Remain Unchanged

Price changes were conspicuous by their absence during the opening days of the show. While it had been generally felt that the end of the New York show also was the end of price jockeying for the present, some uncertainty still existed when the Chicago exhibit opened. On Sunday night, however, it looked as though few additional changes of importance were going to be recorded. This indicates that the industry is all set as regards prices and that uncertainty on that score need not stand in the way of a strong spring selling season.

Executives are even more optimistic about the general business outlook than they were three weeks ago. Local shows in Detroit, Brooklyn, Cincinnati, and Cleveland all have resulted in exceptionally good sales, the Detroit exhibit in particular having recorded large gains over last year both in attendance and total business. Consequently, predictions of good automotive business for the year are being made even more confidently than before.

The sales manager of one important parts company, for instance, is emphatic in his belief that 1925 will see his company building more units and making better profits than in any previous year in its history. While everyone does not feel quite so optimistic as this particular executive, "probably commercial sunshine" is the economic weather prediction being made in most cases.

While the Chicago display lacks the magnitude and splendor of the New York exhibit, the beauty of line and variety of color which characterizes this year's cars has resulted in a bright, interesting show. All of the exhibits were shown under one roof for the first time. Lighting arrangements have been materially improved and the entire setting is better than that of any Chicago show in many years. About the same number of cars are shown as in New York, but the opportunities for display in the Coliseum are scarcely comparable to those given by the vast expanse of the big Bronx armory.

## The Mystery Car

THE new car represents an intelligent effort to construct a small, high efficiency type of passenger vehicle. In it are incorporated many engineering features which make for simplicity of design and ease of manufacture. Only a few details are available on the car exhibited. It is a five passenger phaeton finished in a dustproof gray lacquer. The wheel base is approximately 103 inches.

The body design incorporates some novel innovations. The door locks have a spring loaded gear mechanism which when the door is opened is normally in the locked position. A slight pressure of the door against the body pillar supporting it contacts with a release button on the latch which releases the latch spring and locks the door.

The top is of the permanent type and is provided with a metal deckrail of Tee section which also functions to carry the tops of the side curtains. The curtains themselves are transparent all over with the exception of the metal binder on top which permits of their anchorage to the deckrail. The greater area of vision secured is made possible by the method of anchorage and the fact that the curtain units are not folded for storage. A vertical compartment back of the rear seat back cushion houses these curtains.

The permanent top extends about six inches beyond the front face of the one-piece fixed windshield. Between the windshield and the front extremity of the top is a full length steel stamping which functions as an adjustable ventilator. The front edge of this visor shaped stamping is screwed to the top while the rear engages notches in an extension fitted to each vertical post of the windshield. The angle of the ventilator unit installation is such that its natural springiness serves to lock it securely in the desired notch.

The power plant is a four cylinder block cast engine with an integral banjo shaped bell housing carrying the wet plate clutch and three speed transmission unit. The transmission operates in oil but is sealed against oil leakage from the clutch compartment. The front end of the block casting is supported in a cradle mounting which in connection with the bell housing gives three point suspension.

The engine proper is of the ell head small bore long stroke type with a piston displacement in the neighborhood of 150 cubic inches. A very short and rigid crankshaft and connecting rods with ten inch centers are the only internal details available. A Zenith top outlet carbureter bolted to an integrally cast inlet-exhaust manifold and an Autolite electrical system comprise the engine accessories. Cooling is by thermo syphon in connection with a tubular radiator which is fitted with a curtain normally concealed in a housing at the bottom of radiator core. The curtain is actuated from the instrument board and has a range of movement sufficient to cover over two-thirds of the radiator face.

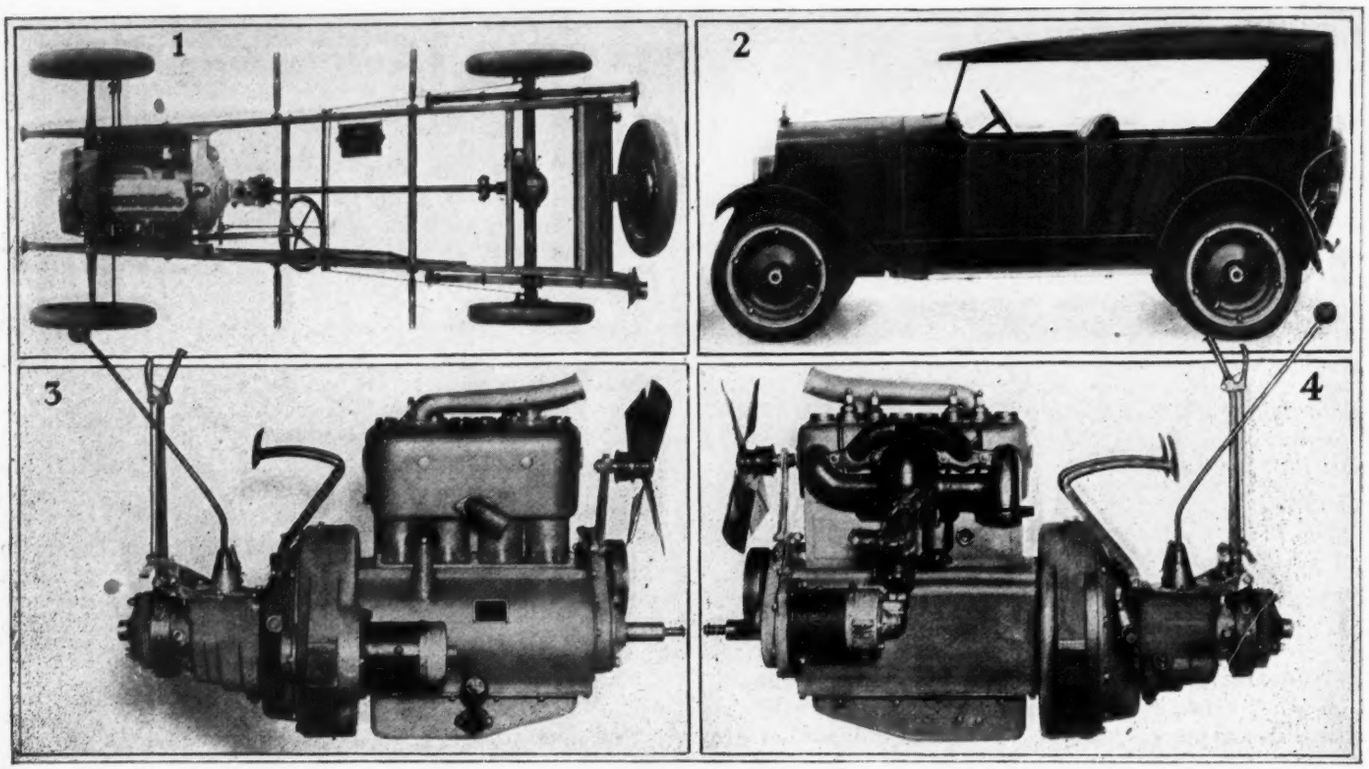
A gasoline gage, ammeter, switches, spark and gas, curtain, and choke controls are all carried on the instrument board. There are no accoutrements on the steering wheel or shaft. The horn has a dual control and can be operated either from the instrument board or by the driver's knee contacting with a vertical bar switch running the full height of the door panel front pillar. A combination backup, tail, and stop light utilize only two bulbs and a single switch. Disk wheels of non resonant design, balloon tires and worm steering gears complete the details apparent from a summary examination of the chassis.

### Body Mounted So as to Prevent Squeak

The five passenger body is so mounted as to prevent the usual squeaks. The chassis frame has some features of construction seldom seen in a small low priced vehicle. Great rigidity and an increased area of body sill contact is secured by building the frame without kick-up. The side rails are arched downward about four inches at each end to give a low center of gravity and wide range for spring action. There are five tubular cross members of large section with welded on end flanges. In place of the usual rivets these tubular members are anchored with close fitting shoulder bolts which permit replacement of a complete side rail without removing the body or disturbing any of the chassis units on the opposite side.

Springs front and rear are semi-elliptic, the latter being mounted cradle type outside the frame rails. The front ends of rear springs are rigidly anchored to accommodate

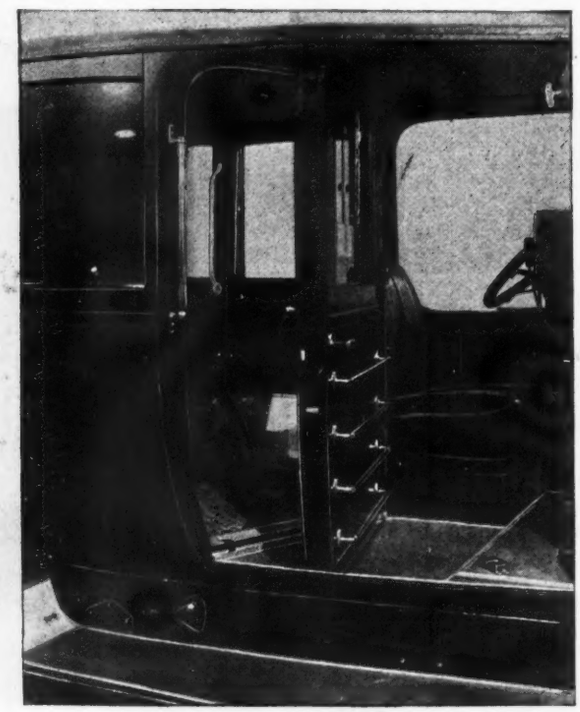
*One view of the exhibits at the Chicago Automobile Show*




*1—Chassis with 103-in. wheelbase. 2—Top which extends to form visor. 3—Right and (4) left sides of compact motor which show simplicity of design and manufacture*

the Hotchkiss drive. The springs have practically no camber and in connection with the frame horns allow the car body to be brought closer to the ground than usual for a car of this light weight.

A semi floating Timken rear axle is connected to an open propeller shaft provided with non metallic joints at each end. The forward joint is mounted just behind the drum of the transmission brake, the load being carried by the rear transmission bearing.



*Showing the right side of the Bauer taxicab with detail of featured door*

The braking system is featured by cable actuated rear wheel internal service brakes which are operated from a foot pedal. A transverse hollow shaft is mounted across the frame just behind the front universal. This shaft carries a crank which transmits motion to the cables, and which in turn is connected to the brake foot pedal. Adjustment of the foot brakes is made by means of a single nut which varies the cable length. Equalization is secured by means of a beam evener.

The hand lever located conventionally is used for the actuation of the external contracting brake on the transmission.

## Bauer Taxicab

AMONG the vehicles shown for the first time, considerable interest centered around the Bauer taxicab. The door at the left side is in the conventional position but the door at the right is directly behind the space where a trunk is normally carried and is hinged at about the center of the car, the door slanting back toward the right. The advantage of this construction is that the two spare seats can be located so that one is directly behind the driver and the other at the right side of the cab in the place normally occupied by the right exit door. This makes it possible for any of the passengers to leave the cab without disturbing any of the others.

The door is provided with bars against which a trunk can rest without doing any damage and also is provided with a latch so that it can be left in the open position to secure maximum ventilation. This construction keeps the driver intimately in touch with those entering or leaving the cab.

Finish of the cab is Duco while Budd wheels and 30 x 5 cord tires are used. The cab is trimmed in leather and is provided with dome light and heater. A curtain at the right of the driver protects him from drafts.

Lighting equipment includes regulation side lights as

well as a spotlight and combination tail and stop light. Lubrication is by means of the Alemite system. American Bosch starting and lighting system is used with a Buda powerplant. The gasoline tank is mounted in the cowl.

## Reo

REO is showing a rumble-seat roadster, finished in gray-green. The manner of entering the rear deck compartment is novel. A step instead of being placed on the front part of the rear right fender, is located directly on top of the fender and a similar step is clamped to the fender guard at a comfortable stepping height. The instruments on the instrument board are grouped in an oval panel, the latter being attractively finished by damaskeening.

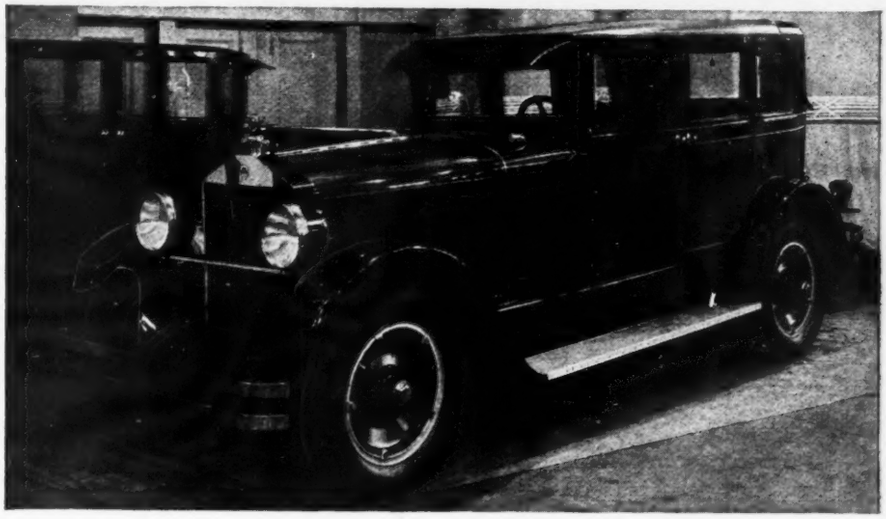
## Elcar

A NEW 5 passenger sedan on the eight-in-line chassis was the feature of the Elcar exhibit, this having been brought out since the New York show. The price is $2,265. This car is upholstered in Baker velour and the door interiors are made attractive with a neat wood panel. Above the cowl board leather trimming gives the instrument panels an attractive setting.

The exterior of the car is characterized by smooth lines, the doors being of the flush type without overhanging bead, while landaulet bows are used to give an air of distinction. Included in the equipment are heater, dome light, automatic windshield wiper, cowl ventilator and curtain at rear window.

## Roamer

A NEW Roamer straight eight was shown, having a "sedan-touring" body with permanent top and glass enclosures. The powerplant is a Lycoming engine. The car on display was provided with steps instead of the conventional running board and had wire wheels and balloon tires, a spare tire, bumpers front and rear, also a Moto-Meter. The windshield is of the slanting type in two pieces with small glass portions at the corners for better vision. The inclination of the windshield is the reverse of that customarily used, approaching closer to the driver at the bottom. The Campbell transmission is used.



*Elcar straight eight sedan which was not exhibited at the New York show*

## Chicago Show Notes

INCORPORATION of all dealer used car advertising into the centralized advertising plan employed by the Jordan Motor Car Company is a departure from former policy contemplated by the Jordan organization in the 1925 program, according to W. B. Riley general sales manager. Under this arrangement Jordan would prepare all used car advertising copy for its dealers. The company's resale valuation plan has produced highly pleasing results, Mr. Riley says.

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It was revealed at the Hudson Motor Car Company's booths that the company's daily production at present is running about 500 Essex and 300 Hudson. While Hudson continues adding dealers, it is said there will be no change, from present indications, in the company's dealer policy.

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Packard announces the appointment of J. H. Marks, efficiency expert, as purchasing agent for the company, succeeding George White, who resigned to take up duties in another organization. Another important change in the Packard organization lately was the promotion of R. E. Macduff, formerly Chicago sales manager, to the position of Northeast District Manager. Mr. Macduff's headquarters likely will be in Detroit. He was succeeded in the Chicago position by C. C. Goodwyn.

Reduction of Packard prices is being followed by rapid expansion of the field organization in order to obtain the coverage now possible as a result of the wider price range in Packard products. While Packard will add many more dealers, it is said there likely will not be many more additions to the distributor organization in the near future. The company is making constant rearrangements and improvements in factory facilities in order to enlarge output which now is at capacity.

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Gardner has doubled its releases on materials for January and February, it was made known at the show. It is said that the company will be in production by the first of next month on the new eight and in production by the first of March on the new six. March will likely be the month in which Gardner will give production the big push, from all indications.

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Bootlegging is not exactly a new game in Chicago, but it was given a novel twist by a kid who planted himself near the Coliseum entrance on Wabash Avenue to sell "dealer tickets." When he saw someone turned down at the doors he was promptly on the job with his "dealer ticket." He had quite a stock of them and knew he could get more where those came from—for all anyone else knows. His sudden disappearance from the scene might mean that some nosey cop forsook the warmth of the Coliseum lobby long enough to butt in.

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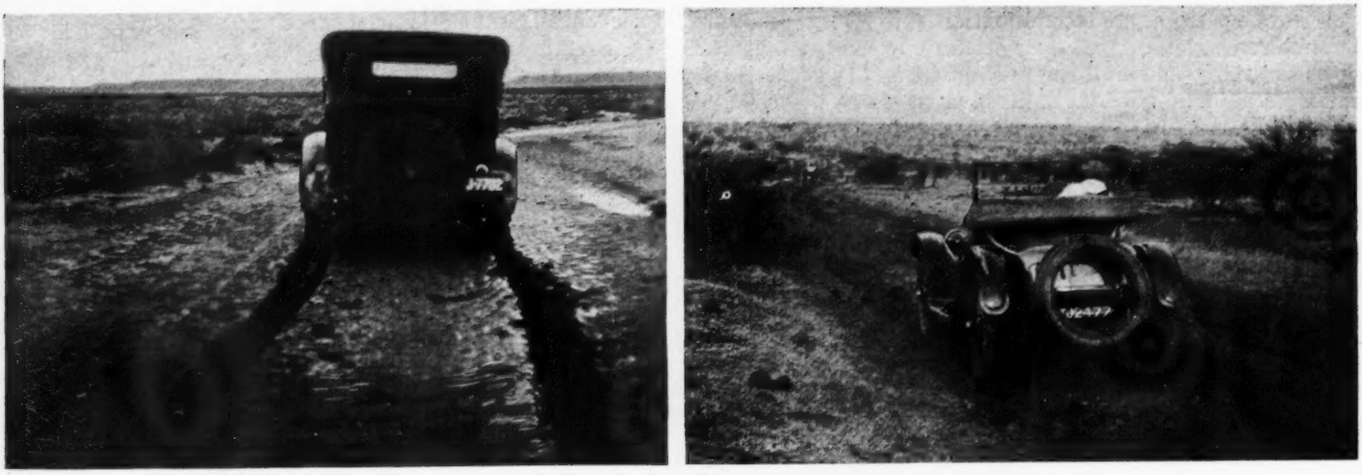
Plans of Wills Ste. Claire, Inc., Marysville, Mich., call for production of 7500 of the six-cylinder model for 1925 and 1800 of the eight-cylinder job.



*Occasionally one runs into mud in South Africa just as one does here, but the clean fenders and backs of both cars indicate that it is not as common as one might think*

# South Africa Needs Cheaper Petrol, Buses, Good Roads and Better Servicing

***Municipally owned buses and street cars threaten fight on privately owned companies. Petrol sells for 85 cents per gallon. Rains helped agriculture. Unemployment problems.***

By M. Edward

THE chief thing on the horizon, so far as the motor industry in South Africa is concerned, is the possibility of a reduction in the price of petrol. Price reductions in America have stirred all the old agitation against the price of gas here.

The motoring public is determined to get cheaper fuel; the oil companies seem just as determined not to give it to them. These latter have produced figures to show that they are selling petrol at little or no profit. Purchasers in South Africa want to know why petrol should sell for 20 cents in America and 85 cents here.

Johannesburg is in the throes of a bus war. The Municipality is trying to save its street-car system, and to that end has asked for a vote of $150,000 for twenty buses. It seems fairly certain that these buses will be used to drive privately owned buses off their routes so that the street-cars can be made to pay.

The position is a difficult one. The public is all for buses. If the Municipality were to succeed in pushing the buses off the routes there would be an outcry from the citizens.

It seems that the only business way to get rid of private bus competition would be to buy out the companies and obtain a charter from the Provincial Council reserving for the Municipality the right of bus transport in Johannesburg. In any case it seems reasonably certain that the twenty buses will be ordered, though nearer two hundred are needed.

A campaign of road building is going on in some of the South African towns, although the country highways are still in dreadful condition, taken all round, Still there seems to be little doubt that the "We want good roads" campaign has had effect. Good roads are being considered by municipalities, the provincial councils and the Government, and it is certain that something will be done to improve means of inter-town travel soon.

Speed traps are being suggested by the police in Johannesburg, but it does not seem likely that this means of raising revenue will be tried, as Pretoria motorists, 36 miles away, have groaned under a trapping system for some time and the futility of the plan seems to have made an impression. We certainly have some speedy drivers, but it is felt that the police should rely upon prosecutions for driving to the public danger rather than upon those based on trapping.

Practically all the 1925 models have now been shown to the public, and have met with approval. At present most of the buying is in the low price field, although the medium grade cars are also selling well. There is very little sale in this country for cars in the top price class. Service facilities are not all that could be desired. Service, in fact, is something that demands attention here, and it is evident that the few firms which are giving it the attention it deserves are winning out.

### Four Years Behind Us with Regards Service

It has been stated, and with perfect truth, that we are four years behind the United States as regards service, and three years behind England. It is a great pity that some reputable agents do not take more care of their service departments. Buyers of certain popular makes of cars complain bitterly because they are unable to get adequate service, in spite of promises when they bought. At present it seems as if those garages really efficient as regards service are the exceptions. We hope to be able to make them the rule.

Good rains have pleased the farmers and car sales in the country districts are very good. The results of the past few months have been above expectations. A few firms endeavored to cash-in on the Christmas season, but the movement was not a whole-hearted one throughout South Africa.

The smaller towns like Port Elizabeth, East London, Bloemfontein and Kimberley are fairly brisk as far as the motor industry is concerned, but things throughout the sub-continent are by no means good.

The new Government has really had little chance of putting into operation the schemes planned to meet growing unemployment, but there is certainly a better feeling.

It seems likely that the importation of accessories will soon be resumed. Although the country is still overstocked, there is need for really salable articles. Of course the sport type cars, equipped with everything the motorist is likely to need, have made a great difference in the sale of accessories.

Balloon tires are being increasingly used and it is safe to predict that South African motorists will soon be demanding them in all sizes. We learn that the prices of high pressure cords have been cut at the factories. This fact is pretty well known among motorists in South Africa, and they are looking forward to a reduction here.

*After a rain the grass grows so rapidly in some sections that roads are easily missed*

# A Substitute for Gasoline Is the Problem of the Hour in France

THE problem of the hour in France seems to be that of a practical substitute for gasoline, and almost every week some new method of producing motor fuel from raw materials of native origin is put forward. The latest aspirant to honors for the solution of the problem is a Russian, M. Makhonine, and some of the Paris papers have published very glowing accounts of the possibilities of his process. From an article by Naval Lieutenant Alfred Baule in *La Technique Moderne*, it would almost seem that Makhonine solved the problem once and for all:

"The motor fuel problem is a three-sided one: First, the fuel must be derived from raw materials which are abundant and comparatively cheap; secondly, the process must be a simple and economical one; and, finally, the fuel must be rich in hydrogenated compounds and burn readily in motors.

"M. Makhonine has solved this problem completely. He derives his fuel from crude oil, coal tar and heavy vegetable oils, all of which are abundant and comparatively cheap. The extraction process is simple, of high efficiency and low in cost. His fuel is rich in combustible hydrogenated products.

"M. Makhonine seems to have succeeded in effecting, under conditions which are easy to obtain, the dissociation of the complex hydro-carbons of the heavy oils and of keeping the elements together in the form of a relatively stable mixture. Now, these elements which, when combined could be burned only with difficulty, by the breaking up of their molecular structure acquire sufficient volatility to permit of their carbonization and combustion in engines; the combustion is possible and complete at low pressure and low temperature.

"The operating process is both physical and chemical; it comprises a distillation which takes place under precise conditions, and also decomposition of the distillates of the raw material, which takes place under the combined effect of heat and pressure, which operating agents need not have unduly high values. The products of the process are as follows:

"1. A liquid fuel of complex composition, of a materially lower viscosity than that of the raw material and of a higher density than that of gasoline, non-inflammable at ordinary pressure and temperature, and of high heat value.

"2. A residue consisting of cinders or aggregates in a greasy mass, of a specific gravity higher than one, and which may find application in certain industries.

"The efficiency of the process is in the neighborhood of 100 per cent from a volumetric standpoint, one ton of crude oil yielding readily 1000 liters of motor fuel. This high efficiency sharply distinguishes the Makhonine process from the so-called "cracking processes," the object of which is to convert residues into either gasoline or any other particular derivative, employing processes that are laborious and expensive.

"The gasoline of the cracking process, moreover, contains a large proportion of olefines, which makes it very difficult to properly refine it. These gasolines are unstable, become resinous and their price is high.

"The Makhonine process, on the other hand, which is remarkable for its simplicity, adds only very little to the cost of the raw materials. In figuring with the present prices of crude oil at the ports of entry, this motor fuel should come to 200 francs per ton, while gasoline costs 2,000 francs."

The above is from a supposedly technical article on the process, in which the "more or less fantastic information which has been printed in the daily press for some weeks" is ridiculed.

The only comment we have to make is that if the claims can be substantiated, especially the one that a fuel equal to gasoline can be produced at one-tenth the cost of the latter, it should lead to a great development of motor traffic in countries that have no petroleum fields of their own. In view of the disappointments experienced in connection with former substitute fuels to which high hopes were attached, one is naturally a bit skeptical.

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IN the caption under the illustration of the Oldsmobile piston on page 63, AUTOMOTIVE INDUSTRIES, Jan. 8, the material was given as being aluminum. It should have read cast iron.

# Just Among Ourselves

### Closed Car Is New Standard of Value

THE tremendous proportions of the trend toward closed cars is visualized rather strikingly by the fact that one make of car which only so far back as 1919 had 9 per cent of its output closed expects practically to discontinue its open models in 1925. The big swing to closed models this year probably will establish a new standard of comparison in the industry. No longer can the 5-passenger open model be considered the standard for price comparisons. Future compilations and comparisons probably will have to be made with the lowest priced 5-passenger closed job as the yardstick.

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### Curiosity Aroused by Mystery Car

IT is said that the mystery car which appeared in the Chicago show is going to be relatively low priced, but if it gets any where near $600 it will be surprising. It has a number of construction and comfort features none too common even in higher priced cars. At any rate it aroused a lot of curiosity and considerable favorable comment. We didn't envy the men the job of showing it. They had a hard time refusing to satisfy the great curiosity which the car aroused.

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### Drop Center Rims Popular in England

ACCORDING to information collected by the United States Rubber Co. relating to cars exhibited at the latest Olympia show, there is a rapid increase in the popularity of the drop center rim on British cars, as well as in the use of balloon tires.

Out of a total of 495 cars exhibited, 116 had balloon tires mounted on drop center rims and 152 had balloon tires on other forms of rims. 198 cars had tires of the high pressure type made in metric sizes and another 39 had similar tires made in inch sizes. 36 cars, chiefly American makes, were fitted with balloon tires of the straight side pattern.

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### Electric Lines Buying More Buses

ROY D. CHAPIN said recently that 1924 would go down in history as the year in which bus transportation came into its own. He was right. Additional evidence appears every day to back up the assertion. Fifty per cent of the production of at least one of the big truck companies consisted of buses in 1924. And now *Electric Railway Journal* announces that the number of buses operated by electric railways has doubled during the last twelve months. The electric railways bought 1063 buses in 1924, according to the *Journal*, as against 621 in 1923 and 240 in 1922.

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### Independents Purchase 90% of Buses Built in 1924

MOTORBUS production totaled about 10,000 in 1924, according to N. A. C. C. estimates. That means that the electric railways bought only a little more than 10 per cent of the total bus output. This indicates that, while the electric lines are important bus purchasers, the bus industry is by no means entirely dependent upon them. Independent operators of various kinds put into service nearly 90 per cent of the buses built last year, if the figures given in the two surveys mentioned are accurate.

### Cleveland Contributes to Traffic Safety Ideas

"TRAFFIC is an engineering more than a police function," says a recent report of the legislative committee of the Cleveland Automobile Manufacturers and Dealers Association. We are glad to see this idea taking hold more and more as time goes on, because it has seemed to us for some time that in it lies one of the most important facts about highway and traffic safety. More sound judgment is contained in the report when it says "effective methods for accident prevention are greater education of the public, creation of more and better streets, and adoption of proved mechanical devices for handling and directing of traffic."

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### Truck Bodies and Traffic Congestion

MORE attention to truck body design is suggested as a means of helping to relieve traffic congestion by P. B., who writes as a private in the great army of American pedestrians. P. B. thinks that some of the ingenuity recently applied to passenger car design might be applied profitably in the truck field. He points out that trucks which have to unload from the rear help to congest traffic and suggests a turntable body. Various ingenious ideas already have been developed, of course, in truck body design. Side-door loading and unloading is being used successfully by several trucking organizations and new types of body are being designed to fit special operating needs. The suggestion that traffic congestion be considered more fully in designing truck bodies, however, is a timely one.

N. G. S.

# EDITORIAL

## What Will 1926 Show Features Be?

A YEAR ago four-wheel brakes and balloon tires were the most prominent features of the National automobile shows. This year great gains in these features of construction were noted but much more comment on other new features, notably eight-in-line engines and lacquer finishes, neither of which were new with this show, was to be heard.

Now it is time for car makers to consider what new features will come to the forefront a year hence. There are those who hold that the public is not interested greatly in new mechanical developments except in so far as they affect performance to a noticeable degree. Doubtless this is true with a certain class of buyers, but the American public generally is interested in things mechanical, especially if they lend themselves readily to easy and logical explanation through intelligent advertising.

All feasible changes in number and arrangement of cylinders appear to have been tried, unless some unconventional form of cycles is to be considered, so that further changes in this direction would be lacking in novelty. Consequently other changes in car design seem to be more promising at the moment.

Lighter and more comfortable bodies, improved cooling systems, transmissions which provide a means for gradual change in torque multiplication without the steps now involved in gear changing, centralized systems for lubricating all wearing parts of the vehicle, long wearing, effective and non-squeaking brakes and suspension systems which promote easy riding and freedom from squeaks and rattles—all of these and many other similar items merit thought when next year's models are under consideration.

Competition now is so keen that a real step forward in any direction well may have a pronounced effect upon the prosperity of the company concerned.

## Positive Distribution

COME to think of it, we do go a long way around in efforts to secure uniform fuel distribution in modern automobile engines and even the best of them leaves much to be desired in this respect.

Most carbureters built today are reasonably good metering devices, but correct proportioning of air to fuel is only the first step toward obtaining a proper mixture in each cylinder. All sorts of heating devices are employed to assist distribution through partial or complete vaporization, yet we have many indications of unequal distribution, especially during the warming up period.

One result of poor distribution is comparatively rapid dilution of crankcase oil, which, if accompanied by abrasive foreign matter, permits rapid wear. Another result is irregular torque impulses with consequent tendency to produce vibration.

Single-cylinder engines do not present distribution problems and usually are considerably more efficient, at least on an indicated power basis, than multiple-cylinder engines. Since this is the case, is it not possible to reap the advantages of the single-cylinder unit and still use as many cylinders as may be considered desirable?

Undoubtedly it is, but to date the extra complication necessary to attain that end has not been thought justifiable. When we stop to consider, however, to what lengths some engineers have gone in an effort to secure good distribution and to cure the ill effects which a lack of complete success involved, we sometimes doubt whether a positive distribution scheme actually would be more complicated.

There are a number of ways of securing positive distribution, all of which are worth careful study. Some of them now are being tried experimentally. Those who have not given the possibilities of such systems consideration will do well to review possible designs and compare them with present conventional systems. They may prove less complicated and involve less difficulties than we have been led to believe.

## Art in Bodies

THERE is no gainsaying the fact that great sales appeal is attached to an attractive automobile body, especially when it possesses a somewhat novel appearance which imparts a reasonable degree of "snap" without being extreme. Unquestionably one of the factors which contributed materially to the success of the Chrysler car during the past year was the fact that it had such a body, and similar popularity has attended other good examples of body design which could be cited.

This being the case, a really good body design is well worth seeking and production considerations should not be allowed to becloud this fact. It is true that die and other tool and production costs often are controlling factors tending to determine when a change in body design can be made with profit. But an artistic body need not involve higher costs.

One trouble with many body designs is that production considerations have borne so much weight that due regard has not been given to sales appeal. A really fine body design is an artist's job.

Possibly it is true that few artists have much conception of the engineering factors which are necessary to produce a durable and reasonably priced body structure, but there seems to be no good reason why engineers and body designers with a good knowledge of the artistic cannot cooperate to produce designs which are at the same time artistic and meet every demand of good engineering and moderate production cost.

# Our Industry Today—

## *Manufacturers, Impressed by Developments at Shows, Prepare Plants for Steady Operations—Standardization Idea Spreads*

NEW YORK, Jan. 26—With the period of the larger automobile shows for 1925 near the close, automobile manufacturers have about drawn their final conclusions as to what they are to realize in the way of results this year. Almost without exception observing correspondents who have attended the shows report greater interest on the part of the public in the displays, but, at the same time, more discrimination and increased knowledge about the products of the different factories. This adds to the prevailing tendency toward stabilization and completes the cycles of conclusions, long since reached by the foremost manufacturers, that standardization on a solid basis must be the aim, with changes made only for real advancement and not merely with the idea of attracting the uninitiated eye of prospective purchasers.

This fact is further emphasized by the moves being made by manufacturers to strengthen their distribution forces. In other words, the day of the gay salesman with glittering promises is past. In his place there has come out from the industry itself the man who knows the automobile and all its parts and whose sales talk is more convincing to a public that has increased in its discriminating abilities, as well as in its buying power.

Although price changes and new models have come with the new year, this stabilizing tendency prevails. Manufacturers, impressed by the buying and the prospects developed by the shows, are, in a number of cases, increasing their schedules. Production, however, will be kept close to the apparent demand and the indications are that the surplus stocks at the end of the year will not be very large.

Competition will continue, but it will be of a more substantial kind than ever. Some of the manufacturers have reached the conclusion that with the closing of the Chicago show the danger of radical price reductions for the year will have ended. With the public convinced of this and that there are not to be further radical changes in style or prices, the demand is likely to become steady and on an increasing scale. Those manufacturers who have not already increased their schedules have their plants well equipped and are ready to add to production almost over night.

The wealth of the farmers continues to increase and prosperity all over the country does not cease to spread. With these facts assured and with more foreign markets being opened, there seems to be no further reason to doubt that there will be increased steadiness this year.

### 65,210 HOLD G. M. STOCK

NEW YORK, Jan. 28—According to announcement by General Motors Corp., a total of 5,574,000 shares of stock was held Jan. 1, 1925, by 65,210 investors.

## Detroit Deliveries Total 64,462 in 1924

### Of This Amount 88.9 Per Cent Was by the First 10 Manufacturers

DETROIT, Jan. 28—Deliveries of new cars in Detroit during 1924 totaled 64,462, of which 57,365, or 88.9 per cent, were by the first ten manufacturers; 63,302, or 98.2 per cent, by the first 20 manufacturers; 64,414 by the first 44 manufacturers, and the remainder, 48, divided among 27 makes. The total of Ford cars delivered (Ford and Lincoln) was 33,213, and the total General Motors' car deliveries 10,818, these representing the largest deliveries by individual companies.

Segregating the deliveries by price classes shows Ford with 33,000 as getting 51.2 per cent of the total car business of the year. The Ford total, combined with other low priced lines, made up 40,512 deliveries, or 63 per cent of the total. In the $1,000 price class deliveries approximated 8153, or 12.7 per cent. Medium priced car deliveries totaled 13,641, for 21 per cent of the total business, and high priced cars made up 3.3 per cent.

Trucks delivered during the year in Detroit totaled 6301, of which 4005 were Fords. Thirty makers did 97.7 per cent of all truck business, which is the same percentage as last year. Among the miscellaneous makes there was a drop from 53 makers to 38, a narrowing of the field of manufacturers of 15. The total truck deliveries showed a gain of two trucks over the year before.

Passenger car deliveries gained 4 per cent over 1923. Closed cars made a decided gain during the year, leading open cars by 21.2 per cent, as against 1.2 per cent in 1923. In every month closed car business ran far in excess of open, being especially heavy in the early and late months of the year.

A summary of new car sales by months shows that in four months—March, April, May and June—49.5 per cent of the total year's business was done. During 1924 the volume during these months increased over the previous year by 3 per cent, but dropped heavily in the last six months.

A summary of new car sales by months follows:

| Month | Open | Closed | Total | Percentage of total for year |
|---|---|---|---|---|
| Jan. | 1,361 | 2,833 | 4,194 | 6.5 |
| Feb. | 1,642 | 2,943 | 4,585 | 7.1 |
| March | 3,309 | 5,059 | 8,368 | 13. |
| April | 3,863 | 5,205 | 9,068 | 14.1 |
| May | 3,867 | 4,740 | 8,607 | 13.4 |
| June | 2,718 | 3,028 | 5,746 | 8.9 |
| July | 2,668 | 3,221 | 5,889 | 9.1 |
| Aug. | 1,759 | 2,588 | 4,347 | 6.7 |
| Sept. | 1,464 | 2,673 | 4,137 | 6.4 |
| Oct. | 1,258 | 2,528 | 3,786 | 5.9 |
| Nov. | 739 | 2,081 | 2,820 | 4.4 |
| Dec. | 701 | 2,214 | 2,915 | 4.5 |
| Totals | 25,349 | 39,113 | 64,462 | 100. |

Open cars 39.4 per cent of total
Closed cars 60.6 per cent of total

## C. E. Gambill Elected President of N. A. D. A.

CHICAGO, Jan. 28—At the eighth annual convention here of the National Automobile Dealers Association Charles E. Gambill, Hupmobile distributor in Chicago, was elected president. Other officers were elected as follows:

*First vice-president* — Charles B. Warren, Nash distributor, New York.

*Second vice-president* — W. L. Hughson, Ford dealer, San Francisco.

*Treasurer*—F. W. A. Vesper, Buick dealer, St. Louis.

The new officers were installed at the annual banquet of the association. Among the guests were H. H. Rice, president of the Cadillac Motor Car Co.; C. W. Nash, president Nash Motors Co; A. L. Reeves, general manager National Automobile Chamber of Commerce; Thomas O'Brien, assistant sales manager Olds Motor Works; Nelson B. Phillips of Dodge Brothers and H. P. Cupper of General Motors Corp.

John A. Butler, Dodge Brothers dealer of Kansas City, Mo., is the retiring president.

## U. S. Men Leave to Study Market in the Orient

WASHINGTON, Jan. 28—With a view of primarily studying the automotive markets in China and Japan, Frank R. Eldridge, chief of the far eastern division of the United States Bureau of Foreign and Domestic Commerce, left the United States for China on Jan. 27. He is with an official delegation of the Seattle Chamber of Commerce, sent to invite business men of the Orient to attend the foreign trade convention to be held in Seattle on June 24.

# Jordan Says Finance Test Period Is Here

## Makes Speech at Annual Meet of Michigan Automotive Trade Association

DETROIT, Jan. 28—The largest and most enthusiastic annual meeting of the Michigan Automotive Trade Association was held here at the Hotel Statler, over 300 members from all cities of the State attending. Membership increased 20 per cent during the year, and the association is looking to its most prosperous year in 1925.

Edward S. Jordan, president of Jordan Motor Car Co., was the principal speaker at the annual meeting, his talk being the only one at the evening session of the meeting, which was featured by the annual dinner. Speakers at the afternoon session were C. A. Vane, general manager of the National Automobile Dealers Association; E. St. Elmo Lewis, vice-president, Campbell-Ewald Co., Detroit, and C. H. Didriksen, Detroit manager of the General Motors Acceptance Corp.

The morning session was given over to the business meeting, at which the following new officers and directors were elected: Guy A. Butler, Jackson, president; G. L. Simmons, Flint, vice-president; L. H. Saunders, Detroit, treasurer; directors, J. B. Toland, Benton Harbor; F. R. Lusk, Grand Rapids; Guy S. Garber, Saginaw; Richard E. Fair, Kalamazoo; Albert B. Parfet, Port Huron; Harry R. Graham, Detroit.

Mr. Graham fills the unexpired term of Guy O. Simons, who is now in business in Brooklyn, N. Y. W. P. Staebler, Ann Arbor, the retiring president, becomes a member of the board for three years under the association's constitution.

In his speech Mr. Jordan said that the industry had reached the trading period of its existence and was preparing to enter the financing period. He advised dealers to prepare for this by placing their businesses in a strong position—to adopt budget systems of operating their businesses, to know where they stood at every minute of the year, and to avoid tying up capital in unsalable cars.

The situation calls for courage, Mr. Jordan said. Dealers must learn to forget the fellow across the street.

### NO GOODYEAR PLAN ADOPTED

NEW YORK, Jan. 28—Following publications of reports about refinancing plans, the Goodyear Tire & Rubber Co. issued the following statement:

The directors have informally received and considered a number of suggested plans for the refunding of back dividends on the preferred. No plan has been adopted, no plan has as yet received a measure of approval warranting any announcement as to its character and no specific basis for payment of preferred dividend accumulations in common stock has been discussed or considered by the board.

# *Business in Brief*

*Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

**NEW YORK, Jan. 28—Further moderate gains last week in trade and industrial activity in general are indicated by current reports. Retail trade in some sections was retarded by stormy weather. Stock quotations moved irregularly, and trade was in considerably reduced volume. Sterling exchange continued its march toward parity.**

**Business movements last month, according to the Federal Reserve Board, included an advance of 2 per cent in wholesale commodity prices to the highest since April, 1923; an increase of 10 per cent in production in basic industries to a point 25 per cent higher than last summer, gains of 2 per cent in factory employment and 5 per cent in total payrolls.**

**Production of crude petroleum in the week ended Jan. 17 averaged 2,023,650 barrels a day, comparing with 2,005,000 in the preceding week and 1,889,450 in the corresponding period last year. Prices of crude oil and gasoline advanced throughout the country, despite the high rate of output.**

**Cotton ginned prior to Jan. 16 amounted to 13,308,000 bales, as against 9,944,000 bales in the same period last season. Cotton spindles in active operation last month numbered 32,661,949, as compared with 31,789,876 in November and 34,049,852 in December, 1923.**

**Business failures reported to Bradstreet's for the week ended Jan. 22 numbered 528, comparing with 566 in the preceding week and 491 in the corresponding period a year ago.**

**Bank debits to individual accounts reported by the Federal Reserve Board for the week ended Jan. 21 amounted to $12,032,745,000, which is 1.4 per cent greater than the total for the preceding week and 23.4 per cent above that of a year ago.**

**Discounts by Federal Reserve banks declined $59,000,000 during the week ended Jan. 21, bills secured by government obligations decreasing $39,300,000 and "other bills discounted" $19,700,000. Open market purchases declined $17,700,000, holdings of government securities $63,500,000, the circulation of Federal Reserve notes $39,300,000, total deposits $114,200,000 and total reserves $8,300,000. The reserve ratio rose from 76.0 to 78.8 per cent.**

# Ford in 1924 Sold 2,213,928 Units

## Increased Demand in South America Featured the Foreign Sales

DETROIT, Jan. 28—Sales figures by Ford Motor Co. for 1924 show the total distribution in the United States of all units manufactured by the company as 1,951,183. The total car and truck figure is 1,873,581, of which over 200,000 are trucks. The tractor total is 70,101 and the Lincoln total 7501. Foreign sales, exclusive of the territory controlled by Ford Motor Co. of Canada, totaled 187,010, and with the sales by the Canadian company of 75,735 made up a total business by the company in 1924 of 2,213,928 units sold.

Featuring the foreign business, the company notes, was the largely increased demand in South America. Europe also showed substantial increases. The increase in foreign business, exclusive of the territory controlled by the Canadian company, was 19 per cent, this including gains in all units made, cars and trucks, tractors and Lincoln cars. The gain in tractor business in export fields was especially good and was shared in by all countries.

There is little possibility of the company's manufacturing expansion in the British Isles leading to the locating of plants in that country by American parts makers, according to the company's views, as under its policy of manufacturing in England it makes practically all its own parts for the car. As it now stands the British car is about 95 per cent made in England. This percentage will be increased as it becomes feasible to extend manufacturing there.

Extension of the company's business in Germany is going forward. Shipments of cars and trucks are being made into Germany from Antwerp and Copenhagen, and the dealer organization is gradually increasing. The company is not setting up any credits for German dealers, but is assisting them in every way in arranging credits with German bankers.

### FRANKFORT REORGANIZED

FRANKFORT, IND., Jan. 28—The Frankfort Machine Works of this city has been reorganized and is producing several devices in the line of automotive tools and accessories. In the reorganization C. H. Wills, Joseph M. Druecker and William F. Rose, all of Kokomo, Ind., acquired interests in the company. Charles R. Bowers of Frankfort, who started the company three years ago, is president; Mr. Druecker, vice-president, and Mr. Wills, secretary-treasurer. Mr. Rose, who was connected with the production end of the Haynes Automobile Co., has been named general manager.

# Milwaukee Show Establishes Record

## For the First Time the Attendance Passed 100,000—Many Sales Reported

MILWAUKEE, Jan. 28—Probably the best index of the attitude of the public toward the annual Milwaukee show, which lasted eight days, is the fact that the admissions exceeded the 100,000 mark by a very slight but gratifying margin. This was the first time since the show was instituted 17 years ago that the attendance passed 83,000, the record established in 1924. This year, like last, the admission price was 50 cents, including war tax. Prior to 1924 75 cents had been charged for six or seven years.

It has been a cherished dream among officers and members of the Milwaukee Automobile Dealers Association that the total attendance at a local show might some day reach 100,000, and the dream has now been realized.

Expressions from dealers exhibiting at the show, including every established dealer in Milwaukee, indicate a greater satisfaction with the volume of business done than has ever been the case. Obviously it would be almost impossible to gain an accurate idea of the number of cars actually sold at the show, but in most instances exhibitors claimed this to have been the most productive of real results in sales and lining up prospects of any show.

Conversation at the show revealed a much different attitude on the part of visitors than a year ago. At that time resistance to sales argument was fairly strong, reflecting a lack of confidence in the outcome of 1924 business. Now it appears that 1924 business developed to a more favorable extent than expected. Moreover, there is a definite feeling of confidence that this year will show marked improvement.

While dealer conventions and conferences are not new during a Milwaukee show, the number during the show was probably twice as large as ever before, and the registration of dealers at the show greater. Dealer interest was unusually intense.

### Nash Sees Survival of Fittest

Charles W. Nash, president of the Nash and Ajax, epitomized the thoughts when he spoke to his Wisconsin and upper Michigan dealers at the annual conference thus:

> There is no question that this year will definitely mark the elimination of the weaker concerns. I say this advisedly, for the situation was made very plain to me at the New York show, and was emphasized at the Philadelphia and Buffalo shows following. I do not think it is right or proper to glory in the downfall of others, but the fact remains that at the Chicago show there will be something like 50 makers. Contrast this with the 100 or more makers in the national shows three and four years ago.
>
> Like all other great industries, this automobile business is simmering down to a small group of manufacturers best qualified by ability and financial stability to carry on the task of giving the public the very utmost for each dollar spent.
>
> After all, that is the true test. The manufacturer who can do that to the greatest degree is the one who succeeds the best.

For five or six years prior to 1924, the M. A. D. A. conducted two major shows a year, the winter show in the Auditorium and the fall show at the State Fair park near Milwaukee late in August or early in September. Difficulties arose last summer which resulted in the cancellation of the State Fair show. It probably never will be held again. With an interval of a full year instead of but four months between shows, it is likely that the appetite of the public was whetted to keenness and contributed to the record-breaking attendance at the exposition held this week.

It is safe to say that show visitors' ideas concerning the worth of used cars have dropped considerably.

# Rochester Reports Record Attendance at Show

ROCHESTER, N. Y., Jan. 28—At the 17th annual automobile show of the Rochester Automobile Dealers Association in Edgerton Park here all previous attendance records were broken, and many firms reported all previous sales records shattered.

According to S. Park Harmon, secretary of the dealers association and manager of the show, 43,262 persons attended during the week. Last year's total attendance was 41,205. The names of several thousand prospects were obtained and scores of sales reported. One dealer sold a large sedan one minute after the show opened. Another dealer reported 12 cars, all in the $1,500 class, sold during the week.

The final night was enlivened by the drawing for an Overland coupe-sedan offered as a free prize by the Rochester Automobile Dealers Association.

More than 350 cars were exhibited in two large buildings, while a third building was given over entirely to accessory exhibits. The Rolls-Royce exhibited at the show for the first time this year. This week's show also saw the first boat exhibit during its 17 years.

# Many Sales Reported at Brooklyn Exhibit

NEW YORK, Jan. 26—More sales than at any previous exhibit were reported by dealers at the 14th annual Brooklyn automobile show, held under the auspices of the Brooklyn Motor Vehicle Dealers Association. A total of 44 car manufacturers, six truck makers and 35 local accessory firms placed 1925 products in the exhibit, which was viewed by large crowds. The decorations were of buff and blue.

Accessories were displayed at the rear of the 23rd Regiment Armory, where the show was held.

# Montreal Show Breaks Canadian Records

## There Were Over 100,000 Paid Admissions and Numerous Sales

MONTREAL, CAN., Jan. 28—A new record in attendance for a motor show in Canada—over 100,000 paid admissions—was established at the national motor show of eastern Canada held here under the auspices of the Montreal Automobile Trade Association, in charge of Adelstan Levesque, who recently resigned as active secretary of the association to become managing director of the International Exposition Co. of Canada, Ltd.

Another new record was established in the way of exhibits, the value totaling $1,000,000. There were on display over 32 different makes of passenger cars and taxicabs, 17 different makes of commercial trucks and tractors. Accessories and parts exhibits numbered 34. The exhibits occupied the fifth, sixth and seventh floors of the Morgan Building, covering an area of over 105,000 sq. ft.

Women attended the show this year in greater numbers than ever. The closed car type made an unmistakable appeal to women buyers or to male buyers whose choice is influenced by women. L. M. Hart, president of the association, said it was impossible to give the exact number of cars sold, but that it was very large, running into hundreds. According to many dealers, recent reductions made by a number of manufacturers has had the effect of greatly stimulating sales and will continue to do so on an even larger scale within the next few months.

The association committee in charge of the exposition consisted of L. M. Hart, R. G. Gilbride, Florian Leduc, Alex. Renaud, J. O. Linteau, J. O. Smith and A. M. Jaques.

# Philadelphia Shows Gain in New Car Sales

PHILADELPHIA, Jan. 28—Following the automobile show here new car sales have improved substantially over those of last month, and a small increase over the corresponding month last year has been recorded.

Used car sales are about the same as a month ago and better than the corresponding month in 1924. Stocks of dealers' "trade-ins" have been notably well cleaned up in this territory and from the dealer viewpoint conditions are better than they have been for some time.

Sales prospects in the rural districts have become somewhat improved in the last month and it is expected they will grow steadily from now on until well into the spring. Urban sales prospects have brightened considerably since the automobile show.

# Automotive Exports Gain 26,787 in 1924

## In Foreign Shipments the Year Was the Best in the Industry's History

WASHINGTON, Jan. 28—With the shipment during December of 1746 trucks and 11,270 passenger cars, exports of cars and trucks from the United States totaled 178,883 for the 12 months of 1924. In announcing these figures, the automotive division of the bureau of foreign and domestic commerce also stated that the 1923 total was 152,096, the gain thus shown having been 26,787 units.

Canadian shipments for December were not shown in the statement of the bureau, but these are given as 3847 cars and 925 trucks, bringing the year's shipments from the Canadian factories to 56,655 units. Assemblies in the various branches abroad of American companies reached 9676 units for the month, totaling 142,346 for 1924.

The grand total of all of these shipments is shown to be 377,831 cars and trucks, making 1924 by far the largest export year in the history of the industry. The shipments to the non-contiguous territories of Alaska, Hawaii and Porto Rico are not included in these totals, which would add perhaps 2000 additional. The comparative totals for 1923, including the United States and Canadian shipments and the foreign assemblies, was 328,999 units.

### HENRY FORD IN FLORIDA

DETROIT, Jan. 27—Henry Ford and a party of friends left here in the manufacturer's private car for Fort Meyers, Fla., to spend a short vacation.

# California 1924 Sales Total 174,000 Vehicles

SACRAMENTO, CAL., Jan. 27—Figures available here indicate that passenger car sales in California during 1924 totaled 174,000 vehicles, as compared with 224,000 in 1923. The 1924 figures, however, compare favorably with the 1922 total of 150,000.

Drought, foot and mouth disease and other unfavorable conditions are credited with causing the decrease. It is pointed out by some members of the trade that, in view of California's registration of more than 1,100,000 passenger cars the 1924 business represented little more than replacements.

For this reason 1925, unless the present outlook changes, is expected to set a new record, because it will represent not only the normal flow of business, but a certain number of delayed purchases from 1924.

## Exports, Imports and Reimports of the Automotive Industry for December of 1924 and Total for Twelve Months Ending December 31, 1924.

| | Month of December | | | | Twelve Months Ending December 31 | | | |
|---|---|---|---|---|---|---|---|---|
| | 1923 | | 1924 | | 1923 | | 1924 | |
| | Number | Value | Number | Value | Number | Value | Number | Value |
| **EXPORTS** | | | | | | | | |
| Automobiles, including chassis | 12,152 | $9,312,113 | 13,021 | $11,281,486 | 152,096 | $106,295,515 | 178,883 | $131,922,701 |
| Electric trucks and passenger cars | 17 | 14,901 | ..... | ..... | 202 | 286,107 | ..... | ..... |
| Motor trucks and buses, except electric: | | | | | | | | |
| Up to 1 ton | 1,493 | 635,252 | 885 | 411,004 | 19,561 | 7,325,177 | 13,433 | 5,713,836 |
| Over 1 and up to 2½ tons | 365 | 531,746 | 413 | 555,833 | 4,206 | 5,233,203 | 5,209 | 7,082,018 |
| Over 2½ tons | 203 | 543,211 | 80 | 207,863 | 1,092 | 2,758,756 | 1,491 | 3,709,013 |
| Total motor trucks and buses, except electric | 2,066 | 1,710,209 | 1,746 | 1,334,973 | 24,859 | 15,317,137 | 27,351 | 19,199,329 |
| **PASSENGER CARS** | | | | | | | | |
| Passenger cars, except electric: | | | | | | | | |
| Value up to $500 inclusive | 3,850 | 1,368,817 | 3,282 | 1,137,310 | 52,539 | 18,606,717 | 59,174 | 21,485,880 |
| Value up to $800 | 2,477 | 1,682,148 | 2,871 | 2,085,887 | 29,697 | 19,697,747 | 42,406 | 29,012,219 |
| Value over $800 and up to $2,000 | 3,477 | 3,749,324 | 4,809 | 5,831,713 | 41,998 | 44,591,387 | 46,256 | 52,083,494 |
| Value over $2,000 | 265 | 786,714 | 308 | 885,258 | 2,801 | 7,796,421 | 3,543 | 9,953,061 |
| Total passenger cars, except electric | 10,069 | 7,587,003 | 11,270 | 9,940,168 | 127,035 | 90,692,272 | 151,379 | 112,534,654 |
| **PARTS, ETC.** | | | | | | | | |
| Parts, except engines and tires: .. .. .... | 2,530,224 | 471,944 | 596,041 | 190,043 | 26,552 015 | 4,292,523 | 11,363,910 | 2,599,691 |
| Automobile unit assemblies* | 21,642,170 | 4,857,343 | ..... | ..... | 243,611,484 | 54,682,384 | ..... | ..... |
| Accessories and parts* | | | | | | | | |
| Automobile service appliances (not elsewhere specified)* | 251,156 | 114,999 | 536,070 | 243,689 | 2,126,994 | 1,076,359 | 7,027,860 | 2,841,453 |
| Station and warehouse motor trucks | 19 | 8,366 | 28 | 10,572 | 234 | 123,575 | 159 | 91,810 |
| Trailers | 19 | 12 851 | 23 | 4,762 | 969 | 346,120 | 554 | 201,191 |
| Airplanes | 2 | 3,000 | 4 | 53,781 | 46 | 308,151 | 56 | 411,458 |
| Parts of airplanes, except engines and tires* | 2,215 | 946 | 160 | 905 | 275,275 | 58,949 | 165,472 | 165,925 |
| **BICYCLES, ETC.** | | | | | | | | |
| Bicycles and tricycles | 2,749 | 24,019 | 572 | 15,193 | 29,412 | 243,950 | 6,967 | 174,733 |
| Motorcycles | 1,687 | 419,746 | 1,540 | 345,263 | 22,112 | 5,298,597 | 16,859 | 4,006,408 |
| Parts, except tires* | 254,283 | 121,421 | 187,231 | 100,407 | 3,286,910 | 1,708,909 | 2,894,221 | 1,596,780 |
| **INTERNAL COMBUSTION ENGINES** | | | | | | | | |
| Stationary and Portable: | | | | | | | | |
| Diesel and Semi-Diesel | 23 | 23,739 | 15 | 74,344 | 1,117 | 435,889 | 1,600 | 610,390 |
| Other Stationary and Portable: | | | | | | | | |
| Not over 8 H.P. | 2,435 | 236,910 | 2,086 | 182,150 | 29,017 | 2,726,476 | 26,397 | 2,517,397 |
| Over 8 H.P. | 154 | 114,347 | 99 | 81,733 | 2,399 | 1,347,304 | 2,228 | 1,586,989 |
| Automobile engines | | | | | | | | |
| Motor trucks and buses | 51 | 7,441 | 2,936 | 233,735 | 3,027 | 350,696 | 4,068 | 415,066 |
| Passenger cars | 1,794 | 272,727 | 6,281 | 690,379 | 37,841 | 4,991,333 | 26,700 | 3,773,360 |
| Tractors | 5 | 2,427 | 50 | 22,546 | 3,374 | 575,518 | 2,467 | 774,544 |
| Aircraft | 6 | 13,780 | 1 | 1,500 | 80 | 65.558 | 146 | 219,609 |
| Accessories* | 448,549 | 234,600 | 445,505 | 193,126 | 7,723,856 | 3,402,991 | 8,040,973 | 3,471,783 |
| **IMPORTS** | | | | | | | | |
| Automobiles and chassis (dutiable) | 47 | 49,519 | 53 | 72,961 | 853 | 884,125 | 604 | 841,324 |
| Other vehicles and parts for them (dutiable) | ..... | 133,058 | ..... | 31,025 | ..... | 1,851,468 | ..... | 884,919 |
| **REIMPORTS** | | | | | | | | |
| Automobiles (free from duty) | 28 | 43,149 | 20 | 21,495 | 2,256 | 2,641,488 | 516 | 753,590 |

* Pounds.

# Gasoline Tax Adopted by Majority of States

## To Date, 36 Have Imposed Levy, Says Vermont Chamber Report

RUTLAND, VT., Jan. 26—In making its gasoline tax report, the Vermont State Chamber of Commerce shows that 36 States throughout the country have adopted the gasoline tax, making a total of three-quarters of all in the country. In three quarters of the remaining 12 States that have not adopted a gas tax, the question, however, remains a live one, and it is possible that many of these will take some action.

According to the chamber, one State has a four-cent tax, nine States have a three-cent tax, two have a two and one-half-cent tax, while 17 have a tax of one cent.

A chart gives the tax in force each year in the 36 States and the District of Columbia, which have the tax. Two States had a gasoline law in 1919, three States in 1920, 11 in 1921, 19 in 1922 and 35 in 1923.

Seven States increased the tax in one year from one cent to three cents, as follows: Arizona, Arkansas, Florida, Georgia, North Carolina, Kentucky and Mississippi. Oklahoma advanced the rate from one cent to two and one-half cents, and Virginia, when the State first adopted the tax, adopted the three-cent rate.

The people of Minnesota on Nov. 4, 1924, indorsed the principle that gasoline tax proceeds shall be "all for roads," through the passing by a big majority of a constitutional amendment providing that all the income from the proposed gasoline tax be placed in the State trunk highway fund. At the same time Missouri, also by a big majority, adopted a two-cent tax and doubled the license fee.

Earlier in the year Congress passed a law for a two-cent gasoline tax for the District of Columbia.

### Favor Taxes for Roads

In Kansas, Iowa and Nebraska, three strong organizations are working for great road programs, to be financed in part through a proposed gasoline tax. In New York and New Jersey special committees were appointed to report to the legislatures of 1925, making recommendations as to automobile tax legislation with the gasoline tax proposition the main issue.

In Wisconsin the State farm bureau federation conducted a referendum on the gasoline tax question, and more than 84 per cent of the votes were favorable to the tax.

### WARNER SUCCEEDS HILL

NEW YORK, Jan. 29—Announcement was made here today that J. A. C. Warner, who for some time has been manager of the research department of the Society of Automotive Engineers, will fill the place recently made vacant by the resignation of L. Clayton Hill, insofar as management of meetings and sections activities are concerned. It has not yet been announced who will succeed Mr. Warner in charge of the research department.

## Mystery Plane Appears at U. S. Testing Field

WASHINGTON, Jan. 27—A new type of American metal airplane, which has been secretly under development for over a year, made its first appearance at Bolling Field when it was tested by Lieut. Wendell H. Brockley. The machine, known as the Loening Amphibian, is the first of ten built for the army air service, according to an announcement by the War Department.

The amphibian machine represents a daring and novel metal design. For the first time the ordinary tractor type of biplane has been modified so that the machine is capable of landing on either land or water.

The machine compares favorably with other airplanes of the same weight in speed and maneuvering ability, but because of its construction of metal and its new design, it is much safer. The machine is equipped with Liberty motors.

## Prices of Gasoline Continue to Advance

NEW YORK, Jan. 28—A number of the larger oil companies continue to make announcements of increases in the price of gasoline, following increases in the rates for mid-continent crude. The Atlantic Refining Co. and the Gulf Oil Co. have advanced their quotations for motor gasoline to 20 cents and for the 68-70 grade to 23 cents, plus the State tax.

The Standard Oil Co. of New Jersey advanced gasoline prices two cents a gallon to 18 cents in North and South Carolina and one cent a gallon, making 17 cents a gallon, in West Virginia, Maryland and the District of Columbia.

Standard Oil of Louisiana advanced gasoline to 17½ cents, tank wagon, and 20½ cents, filling stations. This makes the third advance by this company in 10 days.

The Continental Oil Co. and the Mutual Oil Co., in the Rocky Mountain States, advanced gasoline two cents.

### MORE STANDARIZATION

WASHINGTON, Jan. 28—Citing the example of the automotive industry in the standardization of spark plugs, piston rings and brake linings, benefiting 15,000,000 automobile owners, the United States Chamber of Commerce is preparing to urge a general housecleaning in other lines still loaded with duplications and excessive varieties. It is announced the crane manufacturers are the latest converts.

# Highway Material Standards in Effect

## States Make Changes to Conform with Association Program

WASHINGTON, Jan. 28—Standardization and simplification of highway construction materials have been adopted by the American Association of State Highway Officials in accordance with a program worked out at a meeting held here with the division of simplified practice.

The Department of Commerce has been notified that the program has been adopted by the manufacturers, distributors and users of reinforcing bars.

Simultaneous with the notification of the adoption of the standard highway program, the department was informed by the highway commissions of Iowa and Illinois that their specifications for 1925 construction had been changed to conform to the recommended practices as to standard sizes and lengths of reinforcing bars.

Estimates by government agencies place the amount of steel used in highway construction in 1923 at 37,000,000 lb. in the Federal aid program of highways. The simplification and consequential reduction of sizes, it is figured, will mean considerable savings both to manufacturers and distributors and will be eventually reflected in price and service to highway construction agencies.

## Former G. M. Engineer Plans to Manufacture Tractors

BIRMINGHAM, ALA., Jan. 27—J. O. Heinz, formerly chief engineer of the General Motors Corp., announces that he and associates are planning to build in the near future a plant for the manufacture of tractors and gasoline motors, to be located at Bessemer, 12 miles from here.

Work on the plant, which will be capable of turning out 100 tractors daily, is to be started in a short time. The tractor and engine are of revolutionary design, according to Mr. Heinz. The new company has ample financial backing and no stock is for sale in Birmingham.

### NEW OLDSMOBILE PRICES

LANSING, MICH., Jan. 28—Olds Motor Works announces its official list of Oldsmobile prices, effective Jan. 2, 1925, as follows: Standard touring, $890; standard roadster, $890; sport roadster, $985; sport touring, $1,015; business coupe, $1,045; coach, $1,075; coupe for four, $1,175; standard sedan, $1,285; de luxe sedan, $1,375. These prices are f.o.b. Lansing, with balloon tires standard on all models. The company states that it has not built a delivery body, as previously reported, and does not intend to do so at the present time.

# Past Selling Records Eclipsed at Detroit

## 1925 Show Pronounced Best in Results — Closed Car Demand Heavy

DETROIT, Jan. 28—More persons attended and paid admission to the Detroit automobile show than at any previous show in this city. From this large attendance dealers declare they have been able to cull more actual buyers and good live prospects than from the attendance of any preceding show. Many dealers go so far as to declare it the best selling show held in the city.

Buying at the show ran heavily to closed cars, as was expected, and the coach and low priced closed cars were easily the favorites. One company, which recently reduced prices on all its closed models to open car levels, is reported sold out and not taking orders for earlier delivery than April 1. In several other instances demand for closed cars of low price has been heavier than factory ability to produce, and orders were taken on a deferred delivery basis.

H. H. Shuart, manager of the Detroit Automobile Dealers Association and manager of the show, declares the sentiment of his dealers is that the show was the best from every viewpoint the city has known.

The large attendance means the association's share for the management will be larger than ever. Expenses have been higher than in other shows because of more costly decorations, but the association feels that it has been amply repaid for its effort.

### Many Meetings in Detroit

DETROIT, Jan. 28—More show week meetings were held by manufacturers for dealers during the Detroit show week than during any previous show held here. Among those holding meetings were Studebaker, Willys-Overland, Maxwell-Chrysler, Paige-Jewett, Chevrolet, Oldsmobile, Nash and Hudson-Essex.

The Chevrolet meeting was the largest of the week.

At the Paige-Jewett dinner, S. D. Bolton was announced as the new general manager of the Detroit distribution headquarters. Mr. Bolton was formerly northern Michigan distributor at Saginaw. Speakers were H. M. Jewett, president of the company; Henry Krohn, vice-president in charge of sales; G. C. Mather, chief engineer; S. E. Jamieson, service director, and Walter K. Towers, advertising manager.

George S. Morrow, new manager of the Detroit Oldsmobile branch, succeeding W. J. Clemons, was introduced to the Olds dealer organization at a show week meeting and dinner. Mr. Clemons is to be Pacific Coast representative of the company.

The Willys-Overland meeting was addressed by John N. Willys and L. G. Peed, general sales manager. C. W. Nash addressed the Nash meeting. The Hudson-Essex meeting was held at the factory and was followed by visits to the Detroit show and to the meeting of the Michigan Automotive Trade Association.

### 35 Cars Exhibited at Wilmington

WILMINGTON, DEL., Jan. 28—Thirty-five cars were placed on exhibition at the 10th annual automobile show held in the gold ballroom of the Hotel duPont under the auspices of the Wilmington Automobile Trade Association. In addition there was opened an accessory display in the duBarry room, a banquet hall overlooking the ballroom. Dealers report many sales and prospects.

## 1200 Cars Are Sold at Cleveland Show

CLEVELAND, Jan. 28—Dealers exhibiting at the 1925 Cleveland automobile show sold approximately 1200 cars and paid around $1,200,000 for them, according to data that was gathered from all manufacturers and dealers exhibiting.

These cars were bought by the 115,000 persons who passed through the entrance doors during the eight days that the show was conducted.

The sales were not limited to automobiles. Two airplanes were sold and motor boat exhibitors will make some sales later as a result of the advertising they obtained.

Herbert Buckman, manager of the Cleveland Automobile Manufacturers and Dealers Association, sponsor for the show, declared that the attendance at last year's show was nearly as large as it was this year, but that sales in 1924 could not be compared to the business that was transacted at the exhibit of 1925.

When the doors were closed, many of the automobiles were driven direct to the depot and placed on board cars for transportation to the Chicago show.

## Cities Service Subsidiary Extends Into New York

NEW YORK, Jan. 28—Announcement has been made that the Crew-Levick Co. of Philadelphia, a subsidiary of the Cities Service Co. of New York, has taken over the bulk of the warehouse of the Indian Refining Co., located at Long Island City. This includes six service stations of the Indian Refining Co. The company thus extends its service business into Manhattan, its nearest previous location having been in East New York. The company also has taken over the Indian Motor Truck service here, including the personnel, excepting the salesmen.

The company also announces that it has taken over the bulk station and one service station of the Indian Refining Co. in Schenectady, also at Syracuse and Newark, N. J.

J. W. S. Bessonette is in charge of the New York division.

# Ethyl Gas Danger Slight, Tests Show

## U. S. Bureau Announces Results of Experiments with Small Animals

WASHINGTON, Jan. 28 — Increased hazard from automobile engine exhaust gases, due to the use of tetraethyl lead in gasoline, is inappreciable, it was announced here by the Interior Department, following a series of experiments with various types of small animals subjected to the products of combustion from ethyl gasoline at the experiment station of the bureau of mines. The animals used in the experiments, although exposed for 188 days to unusual concentrations of exhaust gases from ethyl gasoline, showed no symptoms of lead poisoning.

One of the outstanding problems confronting automotive engineers in attempting to construct motors of greater economy is that of eliminating the "knock" from the operation of the engine, the bureau investigators point out. Recent investigations of this detonation or knock in internal-combustion engines, especially of the high-compression type, have demonstrated that it can be eliminated or reduced by decreasing the reaction velocity of combustion by adding small quantities of certain compounds.

This makes it possible to use engines of higher compression ratio, thereby greatly increasing the mileage per gallon of gasoline consumed. The saving in fuel reserves from increasing the proportion of crude oil marketable as motor fuel, and in permitting the designing of more efficient engines, are obvious.

### Only Danger to Mechanic

Ethyl gasoline, one of the widely used anti-knock fuels, is ordinary motor gasoline to which has been added 3 cubic centimeters of tetraethyl lead and 2 cubic centimeters of a halogen carrier, as ethylene dibromide or trichlorethylene, or approximately 0.06 per cent of the lead compound and 0.04 per cent of ethylene dibromide by volume.

Ethyl gasoline should not be confused with ethyl fluid, which is a mixture of concentrated tetraethyl lead and ethylene dibromide in the proper proportions for mixing with gasoline, but is not a motor fuel and is not sold to the public. Also tetraethyl lead is not a motor fuel and, likewise, is not sold to the public.

The only danger of lead poisoning from products of combustion from ethyl gasoline seems to be confined possibly to the mechanic who is continually cleaning carbon from motors.

### BUICK BRANCH DINES

NEW YORK, Jan. 27—More than 1000 employees and executives of the New York branch of the Buick Motor Co., whose headquarters are at Broadway and 55th Street, attended the annual dinner of the concern at the Commodore Hotel.

# Optimism Stimulated by Cleveland Show

## Attendance 15 Per Cent in Excess of Last Year — Rallies Feature the Week

CLEVELAND, Jan. 28—The 24th annual automobile show under the auspices of the Cleveland Automobile Manufacturers and Dealers Association, not only brought out an attendance that shattered all previous records for such exhibits, but it started the automobile industry on a far broader business impetus than did any previous show. The attendance was 15 per cent in excess of that of last year.

The show opened with a paid attendance on the first day that broke all previous records, and crowds continued to surge into the auditorium daily until the doors were closed Jan. 24. A statement by Neal G. Adair, show manager for the National Motor and Accessory Manufacturers Association, illustrates the general feeling of leaders in the industry that the show has inspired.

"For one thing, steady and continuous employment for workers in Cleveland accessory plants is assured," he said. "Orders have been piling in on our exhibitors with increasing rapidity. We are more than delighted with the results that have been obtained here. The Cleveland exhibit is a fine one, and it is one of the most complete shows that I have ever seen."

Motor car dealers interviewed were visibly pleased with the prospects picked up and the sales made on account of the unusual attendance. There is a general feeling of optimism aroused by the success of the show, and they are confident the impetus gained will carry them well into the summer.

### Forty-seven Makes Exhibited

There were 47 makes of passenger cars exhibited, with 185 models on the floors. The ramps along the two main floors were filled with the accessory exhibits.

An aeronautical exhibition, the first in Cleveland, on the east corridor of the balcony floor, attracted many.

Radio equipment, which was exhibited, occasionally tuned in on distant stations and supplemented the concerts that were given daily on the hall pipe organ and by the orchestra. Displays telling of the work of the Cleveland Automobile Club, the automobile school of West Technical high school and the Y. W. C. A. were educational features.

One of the outstanding exhibits was that in the petite salon, where were featured the higher priced cars. Another important development this year was the number of closed cars offered at about the price of open cars. This has had a stimulating effect, for some of the dealers reported that 90 per cent of their sales on the floor of the show were closed models. Others reported 50 to 80 per cent of sales were the closed models.

Rallies of dealers handling Cleveland-made cars were features. Chandler and Cleveland dealers came here from three States, and they brought reports of returning prosperity. Stearns, Peerless and Jordan companies heard reports of better conditions in the rural districts.

C. W. Nash, president of the Nash Motors Co., was the guest of honor at a rally of Nash dealers Wednesday night. E. H. McCary, general sales manager of Nash, and H. H. Seaman, president of the Seaman Body Co., spoke.

The rally of dealers in the Hotel Cleveland on Tuesday of show week was one of the largest attended events of the kind ever held in connection with a Cleveland automobile show. W. H. Spellman, merchandising director for the Remington Typewriter Co., the principal speaker, gave the audience an outline of merchandising policies that have produced results for his own company, and he forecast a year of general prosperity in which the automobile industry would be the principal participant.

## Chevrolet Displays at Dealer Meetings

DETROIT, Jan. 27—The second of a series of meetings to be held by the Chevrolet Motor Co., in introducing its new models to its dealer organization, was held here coincident with the annual Detroit show. Afternoon and evening sessions were attended by an overflow crowd of dealers from Michigan, northern Ohio and northern Michigan.

Similar meetings will be held in many other cities of the country. Motion pictures depicting the features of the car will be released to dealers for the benefit of their sales staffs. The meetings were under the direction of R. H. Grant, vice-president and general sales manager. Every purpose of the company is to be directed to aiding its dealers retail cars. Mr. Grant said the company was already efficient as a wholesaler and was prepared to devote all its energy to bringing the merchandising ability of its dealers to the highest point. The sessions here were devoted to emphasizing retail selling requirements.

The speakers, in addition to Mr. Grant, were C. E. Dawson, assistant sales manager; A. F. Young, sales manager for the Michigan zone; R. K. White, sales promotion manager; A. R. Kroh, sales promotion department, and other officers of the sales department of the General Motors Acceptance Corp.

### COL. C. M. DUPUY DIES

PITTSBURGH, PA., Jan. 28—Col. Charles M. Dupuy, president of the Pennsylvania Rubber Co. of Jeannette, Pa., died Jan. 25 at Albuquerque, N. M., from pneumonia contracted while on his way to join a camping party in Arizona, according to a dispatch received by relatives here. He also was vice-president of the Morewood Realty Holdings of New York and a director of the Chelsea Exchange Bank of New York. He served overseas during the World War.

# British Exhibit Ban Arouses Canada's Ire

## As Result All Dominions and Colonies May Boycott Empire Show

LONDON, Jan. 20 (*by mail*)—A delicate position exists on account of the attitude that has been taken up by the Society of Motor Manufacturers with regard to the British Empire Exhibition. It is possible that the entire Canadian exhibit may be withdrawn this year.

The Society of Motor Manufacturers organized a collective British exhibit last year, while its members, who were representative of Canadian manufacturers, occupied space in the Canadian pavilion. The latter are anxious to exhibit again this year, but the society has issued strict instructions to all its members forbidding them to take space individually and will not itself have one.

In consequence the Canadian manufacturers have taken the matter up with their government, which has cabled to the high commissioner in London instructing him to protest against the ban of the society.

Canada, it is said, will certainly not stand interference of this sort from any trade organization, and if the attitude is persisted in, will, as a last resort, withdraw altogether from the exhibition.

Members of the Society of Motor Manufacturers are held under a bond not to exhibit their goods or allow them to be exhibited at any public exhibition within Great Britain without the consent of the society. In the event of a bond signer failing to observe its conditions, he is subject to a forfeit of £250, and the cars he makes or represents are debarred from the Olympia motor show.

### Members Mostly Importers

The reason why the society has placed a ban upon the British Empire Exhibition this year is said to be that a preponderating number of its members are importers of foreign-made cars. Naturally these members do not view with approval either collective or individual exhibits which tend to encourage the sale of British products alone.

It is also pointed out that the export of British cars and trucks showed a considerable increase last year, which is ascribed in no small measure to the collective exhibit.

The matter has assumed national importance and has attained widespread notice in the daily press, for it is feared that not only Canada may withdraw from the exhibition on account of the action of the Society of Motor Manufacturers, but that other dominions and colonies may follow suit, not because they cannot exhibit automotive products, but because the absence of Canadian exhibits of all kinds will detract very seriously from the representative character of the exhibition as a whole.

# Men of the Industry and What They Are Doing

### A. T. Clarage Made President

Arthur T. Clarage, son of the late E. T. Clarage, founder and first president of the Columbia Tool Steel Co., Chicago Heights, Ill., has been elected president of the company, to succeed A. R. Waters, who is retiring. Mr. Waters was also one of the founders and has been active as general manager and president since the company's inception in 1904.

### Niver Made Continental Director

E. W. Niver of Halsey, Stuart & Co., New York investment firm, has been elected a member of the board of the Directors of the Continental Motors Corp. The following were reelected: R. W. Judson, W. R. Angell, W. A. Frederick, Roger Sherman, A. E. Green, James H. Ferry, R. M. Sloane and B. F. Tobin, Jr.

### Dr. Lilienfeld with American Bosch

Dr. J. E. Lilienfeld, professor of physics at Leipzig University, on an extended leave of absence, has affiliated himself with the American Bosch Magneto Corp. as chief physicist in charge of radio research and development work—a new division of the American Bosch Magneto Corp.

### Bias with Steel Products Co.

Marion C. Bias, for 15 years chief of the department of purchases of the old Mitchell Motors Co., Racine, Wis., has been made secretary and treasurer of the Steel Products Co. of Racine, manufacturing valves and fittings for internal combustion engines. He holds a large interest in the concern. Prior to joining the Mitchell company Mr. Bias was associated with the International Harvester Co. in Chicago.

### Matson Appointed Sales Manager

Dean R. Matson of Chicago has been appointed sales manager of the Curtis Auto Co., Milwaukee, since 1904 distributor of the Reo in Wisconsin. He was for six years with the Smith-Sauer Co., distributor of the Marmon at Chicago. The Curtis company on Dec. 1 moved into its new $200,000 headquarters building at Broadway and Martin Streets, that city.

### Rupp Succeeds Guild

J. L. Rupp has been appointed general sales manager of the Westinghouse Union Battery Co., succeeding T. A. Guild, who resigned on account of ill health.

### F. Lee Norton Re-enters Business

F. Lee Norton, former vice-president and general manager of the J. I. Case T. M. Co., Racine, Wis., who retired several years ago, has re-entered active business in association with the Belle City Manufacturing Co., Racine. This concern recently acquired the entire rights to the independent clutch control crawler attachment for Fordson tractors from the A. C. Johnson Products Co. of the same city. Mr. Norton will plan and supervise a sales program which embraces a substantial manufacturing expansion.

### Kenney Made Vice-president

Thomas S. Kenney has been elected vice-president and given charge of the sales department of the Topp Oil & Supply Co., Milwaukee, doing a business of $1,000,000 in gasoline, oil, Ford specialties, automobile paints and finishes and similar goods. Mr. Kenney retired Jan. 1 from the Munson-Kenney Co., Milwaukee.

### M. M. Goudard Here from Europe

Maurice M. Goudard, president of the Solex Carburetor Co. of Neuilly-sur-Seine, France, is in the United States to arrange for manufacture and distribution of his company's product in this country. Mr. Goudard attended the New York show immediately after his arrival and this week studied American designs further at the Chicago show. He is accompanied on his trip by J. W. Ostheimer, a director of the Solex company.

### S. Y. Beach Organizes Company

Stanley Y. Beach, for many years automobile and aeronautical editor of the Scientific American, has organized the Beach Engineering Co., with offices in the Beach Building, 125 East 23rd Street, New York. The company will make a specialty of buying and selling patents, particularly in the automobile and aeronautical fields.

### Knippenberg Joins Prest-O-Lite

Henry Knippenberg, formerly of the Homer McKee Co., has been made manager of sales promotion of the Prest-O-Lite Co., Inc., of Indianapolis. Mr. Knippenberg has been closely identified with the manufacturing activities of Indianapolis, particularly in the automotive field, having gained his earlier training with the former Parry and Pathfinder companies.

### Earle Judd & Leland Sales Manager

H. B. Earle has been appointed sales manager of the Judd & Leland Manufacturing Co., Clifton Springs, N. Y. Mr. Earle was formerly connected with the sales department of the AC Spark Plug Co., Flint, Mich.

### Underwood Changes Positions

A. G. Underwood, formerly accessories sales manager for B. F. Goodrich Rubber Co., Akron, has resigned to accept a position in a similar capacity with A. Schrader's Sons, Inc., Brooklyn, N. Y.

## Michigan Deliveries Gain in December

### New Car Sales During Month Reach 8,552—Total for Year 171,355

DETROIT, Jan. 28—Retail deliveries of new cars in Michigan for the year 1924 totaled 171,355, the December total being 8552, an increase over the previous December, which totaled 6156. The gain in the State for December was in spite of a loss in the city of Detroit, whose totals for the month were 2915 in December, 1924, as against 3227 December, 1923.

Ford sales during the year totaled 87,896, slightly more than 50 per cent of the year's total. The sales total of Ford and other low priced fours was 116,745. Sales of cars in the $1,000 price class exclusively totaled 21,961.

Sales of medium priced six-cylinder cars totaled 28,440. High priced cars totaled in sales 4209. Cars other than those by 30 leading makers totaled 1769 during the year.

Truck sales for the year in the State were 16,163, December showing sales of 936, as against 598 in the same month in 1923.

The Ford truck total for the year was 10,637, December with 586 deliveries showing a gain of about 200 over the previous year.

## California Claims Largest Automobile Investment

SACRAMENTO, CAL., Jan. 27—Although it appears that New York still holds first place in the number of motor vehicles owned, California is laying claim to having the largest investment in automobiles of any State in the country.

It is pointed out that New York has a registration of 1,400,470 cars, while California shows 1,321,480. Due to the greater distance from the factories and the consequent freight charge, automobiles cost about 10 per cent more in California than in New York. If 10 per cent is added to California's figures, the amount held to be fair due to the greater cost here, California would have the equivalent of 1,453,628 cars.

### W. M. WILCOX DIES OF TYPHOID

SAGINAW, MICH., Jan. 26—Merril W. Wilcox, 37, secretary and assistant general manager of the Wilcox Motor Parts & Manufacturing Co. and for a number of years identified with the automotive parts industry here, died of typhoid fever. During the war Mr. Wilcox did much in securing and carrying out contracts with the Government.

# Weidley Motors Sues Stutz for $750,000

## Company Alleges Breach of Contract Resulted in Its Receivership

INDIANAPOLIS, Jan. 28—Suit demanding $750,000 for alleged damage has been brought here against the Stutz Motor Car Co. of America by the Weidley Motors Co. The suit charges breach of contract and alleged subsequent loss of $750,000, forcing the Weidley company, it is alleged, into receivership not long after the Stutz company is claimed to have broken the contract and to have canceled further shipments of motors.

It is claimed that contracts entered into between the two companies called for 5000 motors, to be delivered by the Stutz company, and that the contract was broken in July, 1923, when only 2191 motors had been delivered to the Stutz company.

The suit was brought in the name of William H. Fletcher of this city, receiver for the Weidley company.

William H. Thompson, president of the Stutz company, says the suit will be fought out and that there will be no resort to legal technicalities. He stated a clause in the original contract provided that the Weidley company keep its finances up to a certain standard, which would enable it to carry the burden of the exclusive Stutz contract, and that this was not done. He further stated that this was a cause of discontinuance of business between the two companies.

The hearing was set for Feb. 9 in the March superior court term here.

## Suggest Makers Make $100 as Used Car Limit

SALT LAKE CITY, Jan. 28—A used car plan involving the repurchase by manufacturers and the destruction of cars that have outlived their usefulness is being advocated by the Intermountain Automotive Trades Association of this city. The plan was proposed by Fred W. Alkire of the Alkire-Smith Auto Co.

It is proposed that car manufacturers set a maximum price of $100 to be paid for old cars taken in trade by dealers and limit the number of such cars repurchased in any one year to 20 per cent of their production for that year. Cars so purchased would be destroyed and thus permanently removed from the market. To take care of the cost approximately $20 would be added to the price of each new car sold.

### 200 PER CENT STOCK DIVIDEND

PEORIA, ILL., Jan. 28—Holt Manufacturing Co. stockholders have been given a stock dividend of 200 per cent. The stock of the company, which is located at Stockton, Cal., is very closely held, resting almost entirely within the Holt family. Latest available records show common stock outstanding to the amount of $500,000, out of an authorized total of $2,500,000 during 1924. This million dollar dividend is taken to reflect the general prosperity of the tractor manufacturing industry.

## Reo Reports Increase in Foreign Business

LANSING, Jan. 28—Reo Motor Car Co. reports foreign business for January to be running far ahead of sales in the same month last year. England and central Europe are reported by the company to be taking Reo products in good quantity, England particularly taking cars, buses, chassis and speedwagons in liberal quantity. Following a recent shipment of 20 bus chassis to London, the company has received a cabled order for an additional 12. Bodies for these buses are being built by British buyers.

The company reports its first bus order from Norway as received this month, though speedwagons have been shipped there in large number since these were first introduced.

The West Indies are also reported by the company as taking buses and speedwagons in good quantity, and are also taking new right-hand drive cars in quantity.

## Wants Used Car Buyers Instead of Appraisers

CHICAGO, Jan. 27—A determined campaign to reduce dealers' losses on used cars by eliminating the word "appraisal" from the dealer's vocabulary has been launched by the Chicago Automobile Trade Association.

A statement issued by Henry Paulman, president of the association, states that the two words "appraiser" and "appraisal" are costing the automobile dealers of Chicago $1,000,000 a year. Mr. Paulman, in behalf of the association, urges all dealers to discharge their used car appraiser and employ a used car buyer. He urges that dealers discontinue to appraise used cars offered to the trade and instead value them.

Mr. Paulman says that if dealers and their salesmen will look upon themselves as buyers of used cars and will value such cars as are offered in trade, they will save themselves a great deal of money. The association has sent a bulletin to dealers throughout the city and metropolitan district asking them to pledge cooperation in the campaign.

### BIGLER ACQUIRES MILL

CHIPPEWA FALLS, WIS., Jan. 28—The Bigler Manufacturing Co., Chippewa Falls, Wis., established a year ago by Fred A. Bigler to manufacture and market a new type of automobile truck, has acquired the large planing mill of the O. & N. Lumber Co. in the same city, and on Feb. 1 will start production of the trunk, heretofore made under contract in another city.

## FINANCIAL NOTES

**Dunlop Tire & Rubber Corp. of America,** according to a dispatch from Buffalo, has authorized a certificate creating 160,000 shares of 8 per cent cumulative first preferred stock, par $100, to be paid as required by the conversion privilege of the outstanding first mortgage and collateral trust sinking fund 7 per cent convertible gold bonds. The stockholders also approved an increase in the authorized capital stock by creating an issue of $6,000,000 noncumulative second preferred, par $100. From the latter there is to be issued from time to time shares to the Dunlop Rubber Co., Ltd. (Great Britain), in liquidation of cash advances made and to be made by that company to the corporation—one share of $100 par value for each $100 advanced. The 200,000 shares of authorized common stock remain unchanged. The Dunlop Rubber Co., Ltd., owns 97½ per cent of this stock.

**Hayes-Ionia Co.** first mortgage 6½ per cent serial gold bonds to the extent of $1,000,000, maturing Jan. 1, 1926, to 1935, inclusive, have been sold by McLaughlin, MacAfee & Co., and the First National Bank at Pittsburgh at prices to yield 5.50 to 6.70 per cent, according to maturities. The company is one of the pioneer body building organizations in this country.

**Stewart-Warner Speedometer Corp.** for the year ended Dec. 31, 1924, reports a net profit of $3,501,106 after depreciation, Federal taxes, etc., equivalent to $7.37 a share on the original 474,990 shares of no par stock, compared with $6,728,119, or $14.16 a share in the previous year. Profits of the Bassick-Alemite Corp. are not included in these figures.

**Willys-Overland Co.,** in a letter to stockholders signed by John N. Willys, president, stated that the ratio of current assets to current liabilities is now seven to one and that the annual report would be one of the best in the history of the company.

**Vulcan Motor Axle Corp.** is to be organized, Security Trust Co. of Cleveland having invited propositions for the purpose. The receiver reported assets of about $475,000 on the basis of a going business and liabilities of about $300,000.

**Glidden Co.** of Cleveland has asked authority of prior preference shareholders to refund the present outstanding issue of $2,867,500 of 8 per cent bonds due Sept. 30, 1936, with a new issue of $3,000,000 of 15-year 6s.

**Pittsburgh Plate Glass Co.** has declared an extra dividend of 5 per cent, in addition to the regular quarterly dividend of 2 per cent. The regular dividend is payable April 1 and the extra Feb. 15.

**Sherwin-Williams & Co.** directors have declared an extra dividend of ½ per cent and the regular quarterly dividend of 2 per cent on the common, payable Feb. 16 to holders of record Jan. 31.

**Ford Motor Co. of Canada, Ltd.,** bankers' shares, according to an announcement, have as trustee the East River National Bank, New York.

**Stewart-Warner Speedometer Corp.** has declared the regular quarterly dividend of $1.25 a share, payable Feb. 16 to stock of record Jan. 30.

**Glidden Co.** declared a quarterly dividend of 1¾ per cent on the prior preference stock, payable April 1 to holders of record March 16.

## Hart-Parr Anticipates 50 Per Cent Increase

CHARLES CITY, IOWA, Jan. 28—The Hart-Parr Co. is employing 550 persons at its factory here. The sales for the first two months of its year, November and December, showed an increase of 115 per cent over the sales of the same month in 1923. The management states that at the present time it has on hand orders for shipments of over 300 tractors, and that the company anticipates the volume of sales for the present year will be about 50 per cent higher than last year.

# Steel Sheet Prices Advance $2 a Ton

## Increases Made by Independents —No Announcements as to Automobile Grades

PITTSBURGH, PA., Jan. 28—Prices of common steel sheets were generally advanced $2 a ton here today by independent steel companies. The increase was made effective at once by the Youngstown Sheet & Tube Co., Republic Iron & Steel Co., Sharon Steel Hoop Co., Bethlehem Steel Corp. and Trumbull Steel Co.

No action apparently was taken on prices of automobile sheets, although the new price on one of the common grades, galvanized, will be $2 a ton higher than the automobile grade.

Any firmness in the new price of black sheets undoubtedly will mean an increase in automobile sheets.

The new prices are: Black sheets, 3.70c; galvanized, 4.85c, and blue annealed, 2.80c. These prices are now $2 a ton higher than the present prices of the American Sheet & Tin Plate Co., the leading interest in the trade. This company will take no action on second quarter prices for another month.

Virtual assurance that the price of sheet bars for the second quarter will be $40 minimum is the reason for the advance.

## Industries Seek Hearing on Standard Price Bills

WASHINGTON, Jan. 27—Representatives of twenty-two national industries have called upon the members of the House Committee of Interstate and Foreign Commerce asking for an early hearing of the standard price bills now in the hands of the committee.

The request was backed up with a statement that American business is handicapped by the present uncertainty in regard to the rights of producers to protect purchasers of trademarked goods by fixing standard prices for the resale of these products.

Noel F. Rosasco, representing the American Automotive Equipment Association, was among the delegates.

## Italy Imported 1065 Vehicles in 9 Months

WASHINGTON, Jan. 26—Italian made automobiles and trucks continue to dominate the market in southern Italy, Consul Harold D. Finley at Naples cables the automotive division of the Department of Commerce. He says the Fiat representative in Naples reports the sale of approximately 500 cars during 1924.

Statistics for the first nine months of 1924, the dispatch continues, show the importation of 1065 automobiles into Italy, as contrasted with 168 and 652 during the same periods of 1922 and 1923 respectively. The growing importance of Italian automobile production, however, is shown by the fact that 13,388 automobiles were exported during the first nine months of 1924, as compared with 8538 in 1923 and 8088 in 1922.

An American manufacturer of low-priced cars, trucks and tractors has definitely entered this market and is conducting a vigorous advertising campaign pointing to the servicing facilities which can be rendered to purchasers of this car. It is said that there are 105 authorized service stations in operation within the Kingdom.

# INDUSTRIAL NOTES

**Spicer Manufacturing Co.** plans the construction of a plant at Pottstown, Pa., for assembling purposes. Considerable new machinery is to be installed. The company manufactures universal joints for automobiles.

**Martin L. Glenn Co.** of Cleveland has received from the United States Navy Department, bureau of aeronautics, a contract for 40 seaplanes capable of performing the duties heretofore undertaken by torpedo, bombing and scout planes. The value of the order was placed at $1,000,000.

## Illinois Collections Gain in 1924 on Automobiles

SPRINGFIELD, ILL., Jan. 27—The State automobile department collections in 1924 exceeded those of 1923 by $1,892,411, according to a statement issued by Secretary of State Louis L. Emmerson. The total collections were $11,546,206, representing $10,772,266 from passenger cars and trucks, $349,766 from chauffeur's licenses, and $148,560 from transfers. The tabulations for registrations and fees follow:

| | License | Fees |
|---|---|---|
| Trucks | 140,808 | $ 2,529,778.73 |
| Automobiles | 978,428 | 8,242,487.51 |
| Chauffeurs (Chicago) | 54,014 | ..... |
| Down State | 41,329 | ..... |
| Total | 95,343 | 349,766.50 |
| Dealers | 4,488 | 87,430.00 |
| Duplicates | ..... | 73,992.58 |
| Transfers | ..... | 148,560.65 |
| Motorcycles | 6,873 | 24,002.00 |
| Trailers | 2,044 | 33,899.00 |
| Miscellaneous Fees | ..... | 56,289.28 |
| Totals | 1,132,641 | $11,546,206.25 |

## Aviation Is Offered Insurance Protection

NEW YORK, Jan. 27—Providing the aircraft industry cooperates with the insurance companies, insurance protection, which is needed before aviation can be developed on a commercial scale in this country, will be furnished by the larger companies and underwriting organizations, according to a letter sent to aircraft manufacturers by E. Stockton Martin of the insurance firm of Lunham & Martin.

The first attempt of the insurance companies to issue policies, Mr. Martin points out, resulted in the loss of hundreds of thousands of dollars to companies which accepted such business. These losses arose because manufacturers sold to individuals war planes unfit for commercial use.

# METAL MARKETS

A general advance of $2 a ton in prices of common steel sheets was announced by the independent companies.

While specifications against low-price contracts for steel continue heavy and mill operations, therefore, at a relatively high rate, the outlook is hazy. Quite a little new business is coming out, but nearly all of it is of the hand-to-mouth buying sort. Sales managers themselves seem to be in the dark as to whether the market is merely marking time or whether it is slipping.

Mahoning valley mills report better inquiry for cold-rolled strip steel, and yet a few weeks ago some mills quoted the cold-rolled at 4.25c., while today they appear all eager for orders at 4.15c. The $2 per ton advance in the Chicago steel bar price is generally interpreted in the trade as a stratagem to bring out orders at the old price.

Blue annealed may be called firm, and the undertone of the market for full-finished sheets is decidedly more satisfactory from the producers' point of view.

Some non-integrated rollers whose supply of $37 sheet bars is running low find it very difficult in negotiations for fresh semi-finished material to shade the $40 quotation. In fact, sheet bar producers intimate that they look for higher than $40 prices in the near future.

The object of this attitude is not so much to bring out business at prevailing market prices as to strengthen the sheet market. There are times when the general rule that the sheet market makes the sheet bar market is not quite true, and the present seems to be one of these exceptions.

In some quarters, the recent softening of steel scrap prices is taken to imply a lack of confidence on the part of the steel producers in the continuity of the present demand for steel products. Else, say those who hold this opinion, competition for scrap among the mills would be sufficiently keen to maintain prices unimpaired.

This view may and may not be true. It has frequently happened in the past that, anticipating a very heavy scrap demand, steel mill purchasing agents would force the market down by turning their back on it for a certain time. When the price was low enough to suit them, they would place their orders.

**Pig Iron.**—The market is steady and quiet. Malleable and foundry quotations average $22.50, valley. There may be a few sellers of foundry at $22, but there are also some asking $23.

**Aluminum.**—No metal is less in the limelight these days than aluminum. What business passes is of a decidedly routine character with prices firmly maintained. Consumers and some of the smaller importers feel, however, that when least expected, a change in the prices of the sole domestic producer may completely alter the market's aspect.

**Copper.**—After having lost some ground, the red metal is again strengthening. Some producers will not sell at below 15c. and some consumers will not take on additional metal unless they can shade this price. Automotive brasses and copper products are in good demand at unchanged prices.

## Morris Motors Company to Produce in France

LONDON, Jan. 20 (*by mail*)—It is reported that Morris Motors, Ltd., has concluded arrangements to purchase the good will and plant of Leon Bollée at Le Mans, France, with a view to producing Morris cars within the tariff wall for the French market, and also for distribution to other countries in Europe.

For the present, it is said, the two-litre Leon Bollée car will be continued in production in order to keep the plant going until the arrangements for manufacturing Morris cars there are completed.

# Calendar

**SHOWS**

Feb. 7-14—Kansas City, Mo., Annual Automobile Show.

Feb. 9-14—New York, Eleventh National Motorcycle, Bicycle and Accessory Show, Seventy - first Regiment Armory, under the auspices of the Motorcycle and Allied Trades Association.

Feb. 21-28—San Francisco, Pacific Annual Automobile Show.

March 7-14—Boston, Twenty-third Annual Automobile Show.

March 8-14 — Vienna, Spring Fair.

March 20-29—Geneva, Switzerland, Second Swiss International Motor Exhibition.

April 1-17—Sydney, Australia, Royal Agricultural Show. Embraces automobile exhibits.

April 22-May 7 — Melbourne, Australia, International Automobile Show, under the auspices of the Chamber of Automotive Industries, in conjunction with the Royal Automobile Club of Victoria.

June—Rio de Janeiro, Brazil, Rio Automobile Show, originally scheduled for October, 1924, but postponed for more extensive arrangements.

**RACES**

July 26—Paris, Monthery Track, French Grand Prix.

**CONVENTIONS**

June 22-27—Summer convention of the Automotive Equipment Association at the Broadmoor Hotel, Colorado Springs, Colo.

**S. A. E. MEETINGS**

Feb.—Indiana Section, Automobile Finishes.

Feb. 16—Cleveland Section, Electrical Instruments and Measuring of Chassis Tests by Means of Them, J. H. Hunt, General Motors Research Corp., Old Colony Club, Cleveland.

March—Indiana Section Developments in Transmission.

March 16 — Cleveland Section, Road and Riding Ability, Harry Horning, Waukesha Motor Co., Old Colony Club, Hotel Cleveland.

April 9—Indiana Section, Talk by F. E. Hunt, head of electrical division, General Motors Research Corp.

## Proposed Laws Affect Coast Car Sales

SAN FRANCISCO, Jan. 28—Automotive sales conditions in California are still in a slump, with January showing a falling off from 10 to 15 per cent, as compared with January, 1924.

Several factors enter into the determination of a bad state of the market, with the California legislature heading the list. The lawmakers have just gone into session. Rumors of the drastic laws to be passed by them for the purpose of procuring revenue, and which will be aimed at the motor car owners, are filling the State.

Among some of the laws already submitted are those raising the tax on gasoline two cents a gallon, a move to raise the registration fees on pleasure cars, proposed raising of the rate on truck poundage and several others not yet brought on the floor, but concerning which many surmises have been made, all of them detrimental to the machine owner's pocketbook.

The automotive trade lobbies are at the capitol in full force, as well as lobbies representing the car owners. It is said by veterans that the lobby working in the interests of the automotive dealers and public this year is the largest in history.

A heretofore unnoticed portion of the State vehicle act has been causing considerable trouble for the motor car dealers since the first of the year. The law states that "all motor cars must be registered as models of the year they were actually turned out by the factory."

This portion was inserted by the insurance men to save them trouble in searching through records when insuring a car, but has been a boomerang to the dealers, for the public insists on having a 1925 car in 1925 and resents the 1924 on the certificate of sale, when the car is purchased in 1925. Efforts are being made by the dealers to have the legislature remove this portion of the act.

The San Francisco automobile show opens on Feb. 21, and many sales are being held up because buyers want to see the latest models. Although early season rains were plentiful, they have not been followed up by any more, and a few weeks of northerly gales have dried out both the Sacramento and San Joaquin valleys.

Price cutting has been a factor in slowing up business generally among the pleasure car dealers. The public knows that the company which has cut prices will maintain them at the new low level, and meantime they are waiting to see whether other manufacturers will follow suit.

## Ford Benefits by New French Tariff Ruling

PARIS, Jan. 20 (*by mail*)—Ford parts imported into Belgium for assembly at the Antwerp factory will pay import duty at the rate of 576 francs per 100 kilogrammes, according to a decision announced by the Belgian customs authorities.

When the ad valorem duties, which were 20 per cent on complete cars and 12 per cent on parts, were wiped out, they were replaced by specific duties of 576 and 640 francs per 100 kilogrammes, respectively, for complete cars and parts.

The Ford company protested this on the ground that it was placed at a disadvantage compared with other concerns and intimated that the Hoboken assembly plant would have to be closed unless it was put on an equality.

Under the latest decision, giving Ford the benefit of the 576 francs tariff, the American firm has a slight advantage, for engines which can be built into an automobile or used for other purposes, pay only 150 francs per 100 kilogrammes.

## Seattle Salon Attracts Large Coast Crowd

SEATTLE, WASH., Jan. 21—Motor car dealers of this city held a closed car salon in the New Olympic Hotel here the week of Jan. 12. Practically every Seattle dealer exhibited, a total of 50 closed cars of the latest design having been shown. Attendance was excellent.

The settings for the sow could not have been better. The Olympic Hotel was only recently opened. The salon was held in the grand ballroom and lounge.

## French Automotive Production Reduced

WASHINGTON, Jan. 27 — Increased production of French automobile manufacturers during the year 1924 exceeds the demand and several of the French companies with large productions have reduced their schedules, Assistant Trade Commissioner W. K. Ray cables the automotive division of the Department of Commerce. Some of the plants are retaining their personnels to as large an extent as is possible and are manufacturing cars for stock, while others with diversified lines have switched their employees from one department to another depending upon the products for which there is the greatest demand.

Citroen during the last six weeks has decreased the daily output from approximately 200 cars to less than 150 and has temporarily laid off 3000 of his employees. According to estimates, however, sales during the last quarter of the year will equal and possibly exceed those of the fourth quarter of 1923 and the pessimistic tone of some of the dealers may be accounted for by the fact that they had expected a steady increase in sales which had been continuous for a long time, to last indefinitely without taking into consideration the large output of which factories are now capable and the tendency for automotive sales to decline at this period of the year.

Sales of trucks continued to be very slow during the last three months and the market is still handicapped by the number of used trucks remaining from the war stocks.

Decreased sales are noticeable in the motorcycle market, while the demand for accessories has been very good, especially in low-priced novelties and specialties.

### DUSENBERG SALE FEB. 4

INDIANAPOLIS, Jan. 27 — William Rasmussen, receiver, has announced that he will sell privately the property of the Dusenberg Automobile and Motors Co., Inc., in the office of the company here beginning Feb. 4. The sale is to be continued until the receiver disposes of all of the property.